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SPAWN TAKING OF CHINESE CARP IN THE TONE RIVER, JAPAN (RECORD OF 1957)

by

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The writer reported in 1954 that several species of Chinese carp were believed to have spawned naturally in the Tone River drainage near Tokyo city, based on the fact that a number of young fish of these species have been found in the river waters. In the following year one of our fisheries workers collected some fish eggs in the same river water, which were large in diameter and not comparable to the eggs of any of our freshwater fish so far studied. These eggs, incubated in jars, proved to be of Grass Carp. In the meantime (Kuronuma, 1955) fisheries workers learnt from local fishermen that they had seen the spawning activity of the carp in the same waters where the large eggs were collected.

In 1956 we were quite definite about the spawning of Chinese carp and possessed the knowledge as to their time of activity and the actual spawning ground in the Tone River. This year we have been able to witness the actual spawning behaviour of both Grass Carp and Silver Carp in the Tone River, located about 160 km. up from its estuary at the Inubo Cape, where the river enters Pacific Ocean. The spawning of this year was recorded by Inabe, Nomura and Nakamura (1957), who also made a study on the development of egg to juvenile stage for each species. The workers of Saitama Prefecture Fisheries Experiment Station and the staff of my Laboratory were able to catch mature fish during their spawning, and artificial fertilization was successfully attempted on both Grass Carp and Silver Carp, the first record in Japan. Unfortunately, however, unsatisfactory techniques for incubating the eggs and rearing the fry did not permit their further development (Tsuchiya and Takahashi, 1957).

During 1957, eggs were collected also in the Edo River, a tributary to the Tone River, entering Tokyo Bay. The collection was made at several spots along the river, located at least 60 km. below the spawning ground in the Tone River. Moreover, the date of collection of eggs and the checking of the developmental stages of eggs indicated clearly that these eggs were laid by the two species of Chinese carp at the spawning ground mentioned (Suzuki and Okabe, 1958). The collection and rearing of these eggs were undertaken by the workers of Tokyo Prefecture Fisheries Experiment Station, but, again no satisfactory result was obtained.

The work on Chinese carp in 1957, obtaining more than 20,000 fry under artificial conditions was one of the epoch-making events in the inland water fisheries of Japan (*IPFC Curr. Aff. Bull.*, No. 20, 1957). As explained below, the 1957 work on Chinese carp was carried out by more than 20 workers representing seven institutions.

New discoveries concerning the biology of the Grass Carp and Silver Carp have been made and experience has been gained in the technique of rearing egg and fry. The results so far achieved have been published in part and much of the information in the present article is derived from the publication by Suzuki, Tsuchiya, Watanabe and Tamagawa (1958).

The spawning of the Grass Carp is believed to have occurred during the latter part of June to early July and the spawning action was observed on 29 June and 6 July in the area between Zengashima and Shimonakajo, approximately 8 km.

The most suitable spawning area in the Tone River appears to be in this region where the river is 400 - 450 metres wide and 1 - 5 metres deep with a sandy bottom. The spawning, witnessed in 1957, as in previous years, was accompanied by a rise in water level of about 1 m. The surface water current was 100 cm./sec. compared with 32-80 cm./sec. at normal water level. The water temperature was 17.6°C to 22.0°C, the water transparency 25 cm. compared with a normal 50 cm., pH value 6.9 and the weather cloudy with scattered showers on the previous two days. On 29 June the first sign of spawning was found in the upper part of the spawning area at 0500 hours and spawning activity moved down-stream to the end of the spawning region by 1800 hours.

Visual observation was inadequate to determine whether the same fish which commenced spawning early, continue spawning throughout the day. The spawning population was estimated at 2,000 to 4,000.

Observations suggested that the Silver Carp tends to spawn in the surface water and mostly in the faster current at the center of the stream. In contrast, the Grass Carp were not seen to leap out of the water and apparently spawning activity occurred in the mid-water zone.

Simultaneous spawning by the two species was indicated by the fact that fully mature fish and eggs of both species were collected at the same time.

Several large square lift-nets were used to capture spawning fish and during 10 days' operation, 11 males and 9 females of Gras carp and 6 males and 15 females of Silver Carp were captured. All the males were fully mature, but only 3 females of each species were in suitable condition for stripping, the remainder of the females being immature or spent.

The study suggested that the lift-net as used was not efficient, probably due to the fact that spawning activity appeared to be largely confined to the deeper water near the middle of the river and few fish in spawning condition entered the shallower water in which the nets were operated.

The dry-method of artificial fertilization was used and approximately 1.75 million Grass Carp eggs and 1.25 million Silver Carp eggs were obtained. The fertilized eggs were transferred to the Fisheries Station and divided into several lots which were accorded different treatment, including still and running water.

The incubation and hatching period in still water ranged from 36 to 50.5 hours whereas incubation and hatching in running water varied from 29 to 73 hours for both species. The temperature range in the still water tanks was 20° - 26°C and in the running water tanks 20° - 21.5°C. The survival of the fry 17 days after fertilization was found to be 30.3% for eggs kept in running water while in still water, survival was 4.69% in Grass Carp and 0.26% in Silver Carp.

The newly hatched larvae were extremely sensitive and in the case of Silver Carp were 5.5 mm. long, and 5.9 mm. long, in the case of Grass Carp.

The 1956 experiments showed that mortality was extremely high at the time of hatching and the hatching equipment was modified in 1957 to provide for a regular gentle flow of well aerated water. On the 4th day after hatching, about half the fish in the tray had commenced to swim against the water flow and at 5 days all surviving larvae were swimming strongly in the middle layer.

The early feeding of the larvae consisted of fine sifted daphnia until the fourth day, when prepared artificial food was provided in the form of small cakes placed on unglazed china trays.

About 10 days after hatching the young Silver Carp began to congregate in small shoals at the surface of the water whereas the Grass Carp congregated in a single band-shaped shoal in the middle layer of the water or towards the bottom.

During the 17 days after hatching, the Grass Carp attained a length of 20 mm. and Silver Carp 14.5 mm. The survival rate of the two species together was estimated at 81.7% during the 10 days of tank rearing.

Seventeen days after hatching the young fish were transferred to carp ponds and held for a period of 112 days.

Daphnia culture had been undertaken in these ponds and an ample supply of natural food was available. In addition, artificial feeding commenced 4 days after stocking and also continued until the end of the period.

Total mortality during the period was 29.4% and on the average the Grass Carp increased to a total length of 13 cm., and the Silver Carp to 16 cm., with weights of approximately 28 and 46 g. respectively.

Eggs were also collected from both the Tone and Edo Rivers and hatched in the laboratory. From these, 1,100 Grass Carp and 100 Silver Carp averaging about 3 cm. in length were shipped to Taiwan by air.

The result of this trial shipment was satisfactory and it was recorded as the first case of export of Chinese carp reared in Japan.

The location of the river spawning sites suggest that there is a high proportion of eggs lost by being carried from the spawning area into the brackish water of the estuary of the Edo River in Tokyo Bay. The observations suggest that under the conditions observed, the river water from the spawning ground reaches the estuary in 43 - 50 hours whereas under river conditions, eggs appear to require 40-48 hours before hatching.

From these, it would appear that satisfactory production of Grass Carp from the Edo River will require the application of a well developed technique for collecting as high as possible a proportion of the eggs spawned therein.

Early experiments in the collection of fry from the river waters have not yet yielded satisfactory results but further experiments are being conducted.

Preliminary experience in the distribution of the fry has yielded valuable information and fry from 13 to 17 cm. in length were distributed from the Saitama Prefecture Fisheries Experiment Station to fish culturists and co-operatives in four prefectures.

During the cool fall weather, no difficulty was experienced in transporting the fish but the results suggest that fish of the size indicated above cannot be transported economically. It is believed that an attempt should be made to hold the fish, under controlled conditions, to a size of 3-6 cm. in order to obtain the most efficient results during distribution.

The writer wishes to express his very sincere thanks to Mr. Motoyoshi Yokote of the Freshwater Fisheries Research Laboratory for his generous assistance during the preparation of this article.

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LAW OF THE SEA CONFERENCE AGREES ON HIGH SEAS FISHERIES AND CONTINENTAL SHELF CONVENTIONS

The United Nations Conference on the Law of the Sea agreed on the text of two conventions; one to govern the exploitation of the resources, animate and inanimate, of the continental shelf and the other, the exploitation and conservation of the living resources of the high seas – the ocean beyond territorial waters.

The Conference failed to agree on the breadth of the 'territorial sea' and consequential contiguous fishing zone.

The Conference met in Palais des Nations, Geneva, from 24 February to 28 April 1958. It was attended by delegations from 86 nations of which 81 are members of the United Nations.

Five committees studied the articles and made recommendations to the plenary session. They covered the territorial sea, international navigation, the high seas fisheries, the continental shelf, and access to the sea by land-locked states. Of these, the committees on the territorial sea and on the high seas fisheries were of most importance to the fishing industry and it was these two committees which provided most of the controversy.

Continental Shelf

The Convention on the continental shelf gives coastal states certain proprietary rights over the bottom and subsoil of their continental shelf up to a 200-metre depth and beyond as far as exploitable. Rights were also given the coastal states over sedentary fisheries in such water– mollusks, clams, corals and so forth, crustaceans excepted.

High Seas Fisheries

The Convention on high seas fisheries provides for much greater control over stocks of fish, by a coastal state, on the high seas off its shore. If the coastal state, as a conservation measure, adopts regulations for its own nationals on the high seas off its shores, even 100 or 200 miles distant perhaps, if the same stock of fish is involved, then any newcomers coming in to fish those waters would have to observe these regulations, subject to arbitration in case of any dispute. Similarly, if other nations are fishing in the area and it has not been possible to reach agreement with those states on conservation measures, within a specified time, the coastal state may adopt unilateral measures of conservation, and these will be applicable to other states fishing in the area, but again, subject to arbitration if the measures are not acceptable to the other states concerned.

Abstention Principle

The abstention principle, which is spelled out in the International Convention for the High Seas Fisheries of the North Pacific Ocean, was submitted to the plenary session as a resolution, following passage in committee where it was sponsored by the United States and Canada, but failed to gain the two-thirds majority vote required for passage.

Territorial Sea

The Conference failed to agree on the breadth of the "territorial sea" and consequential contiguous fishing zone. In the final voting two proposals received majority support but neither received the necessary two-thirds vote required for adoption by the Conference. These proposals were :

(a) The Canadian proposal for a 12-mile exclusive fishing zone.

(b) The U.S. proposal of a 6-mile territorial sea and an additional 6-mile exclusive fishing zone, within which historical fishing rights of other nations would be respected.

The Conference decided to request the UN General Assembly, at its session in September, to study the advisability of reconvening the Conference for further consideration of unsettled questions.

Legal Position

The adopted conventions come into force when signed and ratified by 22 countries. Reports indicate that as many as 16 countries may have signed before leaving Geneva. They will be binding on all countries which sign – and while not on those which do not sign – the moral force of the conventions will be weighty and, through usage, they will eventually become international law.

The following is quoted by courtesy of *The Daily Telegraph* (London) :

A firm experimenting with an electronic brain designed to translate English into Russian fed it with the word : "The spirit is willing but the flesh is week."

The machine responded with a sentence in Russian characters which was handed to an expert linguist.

"It says," he reported, "that the whisky is agreeable but the meat has gone bad".

GENERAL TRENDS

Farming Sea Fishes

Farming of ocean fish is only at its beginning, but in two instances the transfer of a species from the Atlantic to the Pacific has led to the development of a new commercial fishery.

In the '90's scientists took 600,000 artificially fertilised larvae of shad, a salt water fish of the herring family (*Alosa sapidissima*) from the Hudson River and released them in the Sacramento and another million, north of San Francisco. The environment was favourable and the take of shad grew from 100,000 lb. in 1888 to 7 million lb. in 1914. Due to economic reasons, and not because stocks have declined, the catch today is about 4 million lb. Canned shad roe is the highest priced canned fish product on the Pacific coast.

Transfer of the striped bass (*Roccus saxatilis*) from New Jersey to California was equally successful. About 1880, some 500 young fish were released on the Pacific coast and by the end of the century the commercial catch was over one million lb. annually. Today striped bass is one of the most important game fishes of California and has been reserved since 1935 by law for sportsmen who take up to 10 million lb. a year.

Transplantation of North Sea plaice, one of the most valuable food fishes, from overcrowded surroundings to better feeding grounds, has been scientifically and commercially successful, but the scheme requires complete co-operation between the many nations exploiting this resource before the maximum results can be achieved. (*Fisheries Newsletter*, 17 (3): 29, 1958.)

Evaporation Losses Reduced

Experiments first started by CSIRO in Australia and based on earlier laboratory experiments have demonstrated that a film of cetyl alcohol can reduce evaporation from water surfaces. In the earlier experiments using flakes and later pellets of the chemical which slowly dispensed and spread a very fine film over the surface of the water, the chemical was confined in small gauze rafts and the films spread steadily down-wind. However, practical difficulties in the application of the chemical in this form and the fact that the film was sensitive to wind effects led to the use of a solvent and in Africa, considerable areas of water have been protected by this means.

In the early field tests, evaporation from small bodies of water was reduced by about 60%, but on some of the larger bodies of water, the reduction in evaporation was only 11%.

The long term effect of such a film on under-water life has not yet been determined but the subject is still under experimentation and it is hoped to issue a review of the known effects in the near future.

For small farm ponds, particularly those used primarily for water supply purposes, the used of this film may have an extremely beneficial effect in arid zones and the development of the experiments particularly with regard to reducing the loss by evaporation in fish ponds will be watched with considerable interest.

In most of the Indo-Pacific Region, evaporation losses are of the order of 1 cm. per day and any technique which can

reduce this loss without adversely affecting the fish and other aquatic organisms will be of extraordinary importance in the development of fish culture in areas where water is in short supply particularly during the dry season. (*WMO Bulletin*, 7 (7), 1958.)

Plastic Fishing Vessel

A Danish manufacturing firm, according to newspaper reports, has completed detailed plans for a fishing vessel made from plastic. It was also reported that the firm hopes to begin production of the plastic-hulled fishing vessel within a year.

The vessel is described as being of 15 tons deadweight, designed for a speed of 12-14 knots. This is about six knots more than the average Danish vessel of this size now in use. The selling price is estimated to be about 75,000 kroner (US$ 10,859). These craft will be the first of this size to be made of plastic. (*Comm. Fish. Rev.*, 20 (1): 82, 1959.)

Use of "Terylene" in Fish Nets

The synthetic fibre "terylene" is beginning to be used successfully in the manufacture of fish nets, according to a report made to the International Fishing Gear Congress, held in Hamburg, West Germany, 7-12 October 1957. This synthetic fibre, developed by a British firm, has been used successfully in gill- and trawl-netting. According to the report, a number of British trawler companies are testing the fibre for near-, middle-, and distant-water fishing.

The British Ministry of fisheries is conducting trials with "terylene" in middle-water trawls and purse-seine netting, and expect to test the fibre in other fisheries in the near future.

"Terylene polyester" fibre, it was stated, has been used also for lifeboat and hatch covers, yacht sails, and tarpaulins. The fibre is now being manufactured in several European countries and Canada. The British firm produces 25 million pounds a year, and larger outputs are expected.

Development of a high tenacity extra-heavy denier yarn is under way and, when commercially available, the heavier nets, such as trawls, will be produced more economically.

"Many fishermen, net manufactures, and twine producers have shown favourable reaction to "terylene", and the filament yarn has been exported for twines and nets."

Most important properties claimed for this filament yarn for twines and nets are high tensile strength, unaffected by wetting, and high wet-knot strength; rotproof, not weakened by mildew; good resistance to sunlight; stability on water immersion coupled with low moisture absorption; good resistance to abrasion under wet conditions; and smoothness and transparancy of the material.

While "terylene" may lose relatively more strength on knotting than natural fibres, its actual knotting strength remains above their level.

Unlike most synthetic fibres, its abrasion resistance hardly differs under wet conditions. It also has good resistance to attack by acids and oxidizing agents, is resistant to sea water, and unaffected by contact with oils and tar.

Both "terylene" and nylon single-knotted nets are prone to knot slippage, but the tendency to slip is less with "terylene". It is possible to treat the net itself with bonding agents to prevent knot slippage. Nets can also be given a heat treatment to consolidate the knots, either in steam or hot air. Steaming the nets on

a frame at 150°C. for 15 minutes has been found most satisfactory.

The paper questioned the necessity to dye synthetic nets, although dyeing has been shown sometimes to give increased catches. As an example, blue-grey nets are used for Norwegian lake trout.

"It is clear that fishermen in general demand nets dyed to a wide variety of shades, from reddish-brown to green and blue, and in many cases they prefer to dye their own nets."

"Suitable dyestuff packages are available to enable the fisherman to dye his nets satisfactorily to a variety of shades at home, if need be. An allowance for shrinkage must be made if the mesh size of the net is critical."

"Terylene" nets are easy to handle because thinner twines can be used and the result is lighter nets, and trawl nets can be towed more easily through the water. "It is thus possible to use larger nets than normally possible with traditional fibres or alternatively smaller vessels can be employed to handle the net."

The synthetic-fibre nets are more expensive than those of natural fibre. The difference in price is less marked when fibre is made into nets because twines of greater runnage (number of feet per pound) can be used.

"Terylene" filament twines can be handled on traditional net "making machines". They are said to be easier to make than from othre synthetic fibre because of their high resistance to stretch. The twines have been processed satisfactorily on single-knot machines.

Describing the development of "terylene" fibre for netting, the paper said a mixed tenacity acetate netting twine was being developed, mainly for pilchard nets. Such a twine would not bruise or damage the fish and would not slip when single-knotted.

The gill-netting has been used successfully, principally for catching salmon and cod. "Terylene" nets have shown up to particular advantage in fast-moving water or ocean currents, where lively fish can dive straight through the net, or when caught by the gills can escape by expanding the net mesh.

"Terylene" drift-netting is being developed to give thicker and more suitable twines, as all synthetic fibres cut into and damage soft fish such as herring. The filament yarn has been used successfully for bottom trawls.

During tests by distant-water trawlers it was found that each trawl net lasted on the average about nine trips and there was one instance of 15 trips recorded before the net was finally lost. The normal net under these conditions is generally good for an average of one trip.

The "terylene" nets were much easier to tow and, being completely rot-proof, drying was unnecessary.

It is understood that cleaner catches were obtained. The ship's crew reported that the "terylene" nets were more pleasant to handle than nets normally used. With a "terylene" trawl, unloading of the cod end may sometimes be made in fewer operations because of its greater strength.

A "terylene" purse-seine net may cost as much as £ 5,000 (US$ 14,000), but trials carried out in Canada with drum seines are encouraging and, with suitable modifications, it should be possible to use their purse seines with great profit.

The twines are also being tried with encouraging results for lobster pots in

place of natural fibres, chiefly because of their rot resistance and general toughness. Head ropes made from the fibre are also being tried out. (*Comm. Fish. Rev.*, 20 (2): 79, 1958.)

Control of Housefly in Fish Curing

In many areas in the Far East, infestation of fish at the drying stages and in salting tubs by common houseflies, may cause considerable loss and frequently result in a poor quality product which leads to an unsatisfactory price in the market.

A recent article in the *South Pacific Commission Quarterly Bulletin* for April 1958 gives some hope of establishing control over, if not completely eliminating, these pests.

In certain areas of the Pacific islands, houseflies were a great problem, particularly as carriers for typhoid and various types of dysentery. Occasionally a serious eye disease, often leading to blindness occurred and the vector of the case was a common housefly. It is probable also that secondary infestations of wounds were the result of visits by houseflies to the injured area.

Several attempts were made to develop a system of control but none proved brilliantly successful until in 1938, the writer of the article, Mr. H.W. Simmonds, during a visit to Java, noticed that the houseflies were in very small numbers.

On the assumption that the houseflies in the area were breeding in cattle droppings as they do in many regions, a collector was sent to examine this material and found a small blackish beetle, *Platylister chinensis* belonging to the family Histeridae.

"Tests showed that one of these predators could consume from 10-20 full grown maggots in 24 hours. Strong colonies were then collected and forwarded to Fiji, Samoa and the Solomon Islands. On returning to Fiji 6 months later, the writer found that they were already well established."

In 1948 the beetle was widely spread throughout the Colony of Fiji and there was a very marked inprovement in the fly position.

Mr. Simmonds concludes his article as follows: "To sum up, two factors, both biological, have brought about this vast improvement, first, the accidental introduction of the ant *Pheiodole megacephala* and second, the deliberate introduction of the Histerid, *Platylister chinensis*.

It must be added that this predator is not likely to work in certain breeding sites of houseflies such as dumps and latrines, but in such places there can be effective control by normal sanitary methods, and the presence of numerous flies at any time now suggests that some such breeding ground is being overlooked." (*South Paci. Comm. Quart. Bull.*, 8 (2): 41, 1958.)

Fisheries Development Programme of SPC

The South Pacific Commission programme in fisheries aims at a better exploitation of marine resources, the bringing into production of natural waters by stocking them with various edible fish species, and the promoting of fish culture in ponds where conditions appear suitable.

Active work in the programme commenced in July 1954 with the appointment of the Fisheries Officer, Mr. H. van Pel. During the second half of 1957 this officer was absent on home leave but work was continued by his Assistant.

The planning and implementation of the fisheries project take place in close co-operation with territorial administrations and populations. Nearly all territories of the region have now been visited by the Fisheries Officer.

At its seventeenth session the Commission approved the creation of a technical committee on fisheries, to advise the Commission on the development of the project.

The three-month Fisheries Training Course, held under the auspices of the Commission and of the Food and Agriculture Organization, closed on 21 February 1957. The Course was attended by twenty five trainees from fourteen Pacific island territories, and by four observers. Fishing operations, fishing gear, fishing craft and fish culture were the four main subjects covered by the curriculum.

While the main burden of teaching devolved upon the staff provided by the Commission and the Food and Agriculture Organization, extremely valuable contributions were made by a number of other instructors. Messrs. M. Legand, R. Geil and H. Rotschi, whose services were kindly made available by the French Institute of Oceania, lectured on marine biology, trouchus ecology and biology, and oceanography respectively, while with the authorization of the Administration of New Caledonia, Mr. J.A.M. Ligonie, Administrateur de 1ere classe de 1' Inscription Maritime, gave instruction in practical navigation.

The comparative importance of theoretical and practical teaching in the Course will be shown by the fact that 125 hours were devoted to practical work, and a further 65 hours to field demonstrations, while lectures occupied 185 hours. Theoretical instructions were followed whenever possible with practical application of the principles learned. Even field demonstrations often included more than the title suggests, as students frequently took part in the actual work involved.

Twenty-two field trips and demonstrations were organized, including day cruises and fishing trials aboard the research vessel of the French Intitute of Oceania, *Orsom III*, visits to various boat yards and industrial plants, to the Catala Aquarium, the laboratories of the French Institute of Oceania, the local fish market, and the Commission's fish Pond at Port Laguerre. In addition, the students carried out fishing trials with nets they had made themselves.

With the exception of one trainee whose health failed eight weeks after the beginning of the Course and who was later sent home on medical advice, all students completed the Course with satisfactory results. Contact has been maintained with them and various booklets on fisheries subjects have been distributed.

Most territorial administration succeeded in making good use of these trained personnel.

An outstanding result of the stocking of natural waters was observed in Lake Siwi, on Tanna Island in the New Hebrides, where a very small breeding stock of *Tilapia mossambica*, introduced in July 1958, produced in less than 17 months a fish population estimated at well over one million. In spite of an exceptional drought which caused extremely high mortality, the fish are solidly established and the local population has started to catch and consume them.

During visits to territories and/or through the distribution of technical documentation, advice has been given on inland fisheries, transfers of trochus and

mother-of-pearl shell, coastal deep-sea fisheries. (*South Paci. Comm. Ann. Rep.*, 1957, pp. 13-14.)

SPC Introduces Pond Fish from Philippines

Following the successful introduction by the South Pacific Commission of the *Tilapia*, which multiplied quickly and from which successful transplantings have since been made to many Pacific territories, about 300 fingerlings of 4 different species of pond fish arrived in New Caledonia by air in January 1958.

These fish, consisting of Carp (*Cyprinus carpio*), Sepat (*Trichogaster trichopterus*), Dalag (*Ophicephalus striatus*) and Goramy (*Osphromenus gorami*) were transported in plastic bags supported in cardboard cartons.

Their rate of growth, breeding and general suitability for introduction to other South Pacific territories will be studied over the next two years and those species which adapt themselves successfully will be used to provide a new source of protein for islanders who do not now receive sufficient in their diets.

It is reported that *Tilapia* are now being grown for food in specially-made ponds and in natural waters in New Caledonia, New Hebrides, Solomon Islands, Fiji, Papua and New Guinea, Natherlands New Guinea, Cook Islands, Western Samoa, American Samoa, French Polynesia, Guam and the United States Trust Territory. (*South Paci. Comm. Quart. Bull.*, 8 (2): 19, 1958.)

Fisheries Research in Russia on Massive Scale

The massiveness of Russian programmes and work in fisheries research was commented on by Dr. G.L. Kesteven, Chief, Biology Branch, Fisheries Division, FAO, on his return from Moscow.

"The Russians have about 50 groups, employing thousands of people, working on fisheries research", he stated. "The staff of the All Union Institute of Research in Marine Fisheries and Oceanography alone amounts to 500 person."

As the result of this widespread activity, the Russsians are "accumulating vast amounts of material."

"My impression was that this extensive work in fisheries research is well coordinated even though it involves many institutions and scientific bodies," said Dr. Kesteven.

While in Moscow, where he attended a meeting of the International Advisory Committee on Research in the Natural Sciences Programme of Unesco, Dr. Kesteven conferred with a number of Russian officials and scientists. One result of his visit is that the Russians have promised to supply FAO with a monthly annotated list of USSR fisheries literature. They have also promised to collaborate in the preparation of a manual on institutions, research organizations and scientific bodies engaged in fishheries work in Russia.

"I found a very keen interest among Russian scientists and technicians in fisheries work and development in the West and in other parts of the world," Dr. Kesteven said. There is an evident desire for closer contacts, which is shown by the number of Russians now going abroad. This is far bigger than is generally known. I was informed that last year more than 600,000 Russians travelled abroad."

Dr. Kesteven added that the Russians were "very keen" to arrange study tours by senior fisheries research officers from other countries.

NEWS FROM MEMBER GOVERNMENTS

AUSTRALIA

PAPUA AND NEW GUINEA

Fishing Industry Development Programme

To implement its programme for fisheries expansion, the Administration is building up its fisheries staff and is training native fishery assistants to work in the villages.

Demonstrations of modern fishing gear are being given to Papuan fishermen to encourage them to use latest techniques. Inland peoples are growing fresh water fish in village ponds.

A new fisheries research vessel, *T'agula*, is operating off the southern coast of Papua. She is 60 ft. long with a beam of 18 ft. and draught of 7 ft., and has accommodation for a European master-engineer, three technical staff and a crew of ten Papuans.

The refrigerator installed is capable of freezing one ton of fish in sixteen hours. Its maximum capacity is five tons. There is an additional five tons holding room only, without refrigerated coils.

Navigation and fishing aids comprise a two-way radio and an echo-sounder and oscilloscope, or viewing unit, with a range of up to 480 fathoms.

The main engine is a 140 h.p. diesel, giving the vessel a cruising speed of 8.5 knots with a fuel consumption of 5 gallons an hour. Cruising range is 1,200 miles.

As an important part of the fisheries programme, the *T'agula* is demonstrating commercial fishing techniques in Coral Sea waters, to encourage private enterprise to provide adequate fish supplies for the expanding populations of Port Moresby and other centres in Papua and New Guinea. (*South Paci. Comm., Quart. Bull.*, 8 (2): 41, 1958.)

CEYLON

Fisheries Centre Completed

The Mutwal Fisheries Centre, under construction for about six years, was formally opened on 2 October 1957. The Center was made possible by a gift of rupees 5,000,000 (about US$ 1,042,000) from the Canadian Government to the people of Ceylon under the Colombo Plan.

The Center includes a cold-storage and freezer plant, a by-products plant, and a machine shop. Two fishing trawlers, one a gift from Canada, are employed in catching fish for the new Centre. (*Comm. Fish. Rev.*, 20 (1): 78-79, 1958.)

Nylon Nets Are Popular

Since 1954 the use of nylon nets by Ceylon fishermen has been gradually increasing. Fishermen on Mannar Island are now using over 400 such nets with good results. The nets are also being used at Trincomalee, Mullaitivu, Point Pedro, Myliddy, Kayts, Karaiyoor, Kalpitiya, Negombo and Kalutara. These nets are

mostly drift nets, although some are also bottom-set gill nets. The size of mesh in use varies from 2.5 to 6 inches streched. Where operated along with hemp or cotton nets, the nylon nets invariably give better catches, usually 2 to 3 times more and there are cases when 10 times more have been reported.

In Ceylon twine is sold for about Rs. 16 per lb. while webbing costs Rs. 20 per lb. In order to reduce the capital needed for nylon nets, fishermen in Point Pedro and Mullaitivu are buying twine and making their own nets. They purchase small quantities at a time and gradually add to their nets.

INDIA

Central Fisheries Research Committee Meeting

The Central Fisheries Research Committee held its 4th Meeting in Hyderabad on the 28th-29th October 1957 and the report of the Proceedings has now been released.

The Research Committee gave particular attention to a review of research work on *Tilapia* and the problem of extension of the culture of this fish into suitable areas in India.

Some experiments are reported to have demonstrated clearly that the survival and growth of Carp fry may be adversely affected by the introduction of *Tilapia*.

It was reported that un-authorised introduction of *Tilapia* had taken place in certain areas and that there was no authority to prevent fish culturists from obtaining supplies of *Tilapia* if they so desired. Numerous requests have been received from certain States asking that restrictions on *Tilapia* should be relaxed and it was reported that in Bombay only the growth of Mrigal and Rohu was adversely affected and that Catla did not appear to be a food competitor with *Tilapia* and the normal growth rate of this species was maintained.

Experiments were being undertaken with new strains of Common Carp from eastern countries but the information available at the moment did not allow a comprehensive analysis.

The Committee also gave attention to the progress of experiments in Paddy-cum-Fish culture and it was reported that the results were by no means consistent. It was agreed that further experiments should be conducted under varying conditions but that these experiments should be taken up only in areas where natural facilities exist for the combined operation of growing paddy and fish.

Considerable interest was expressed in experiments on the artificial spawning of carp by the injection of pituitary extracts and it was agreed that these experiments should be intensified.

The Committee received reports that in certain type of tanks under suitable conditions, spawning of the major carps had occurred and it was agreed that work on the breeding of carp in bundh type tanks should be continued.

The work of the National *Hilsa* Fisheries Unit was reviewed and it was reported that a considerable amount of information collected on this fish with particular reference to the identification of the separated stocks of *Hilsa* had been accumulated and was under examination.

The Committee decided to approach the State Governments to ascertain what contribution they could make to the implementation of a national programme on *Hilsa* and approved the proposal that a Seminar on Methodology in connection with *Hilsa* fisheries should be arranged by the Central Inland Fisheries Research Station.

The work of the *Rastrelliger* research teams was reviewed and it was agreed that the work should be continued and that copies of the proformae relating to collection of data on *Rastrelliger* as finalised by the IPFC should be sent to State Governments and Universities interested in this subject.

Training in Artificial Inducement of Spawning in Fishes

A demonstration centre for a short course training on the techniques of administering pituitary injections for inducing spawning in fishes was organised by the Central Inland Fisheries Research Station, Calcutta, in co-operation with the Fisheries Department, Orissa State, from 10 to 17 March 1958 at Cuttack, Orissa State. The object of the centre was to impart training to the nominees of the States Fisheries Departments and the Ministry of food and Agriculture, Government of India, in the techniques of fish breeding experiments by pituitary injections.

The training consisted of a number of lectures on different aspects of the subject and of demonstrations and field trips. The lectures and the demonstrations were conducted at the library hall of the Orissa Fisheries Department at Zobfa, Cuttack. Two field trips, one to the Kaushalganga fish farm and another to the Killa fish farm was arranged, to enable the trainees to study the pond management techniques, particularly in relation to the fish breeding experiments.

University of Kerala Oceanographic Laboratory

This laboratory was started in March 1957 as a section in the Division of Marine Biology and Fisheries (Department of Research, University of Kerala) for carrying out oceanographic studies of the waters off the West coast of India. At present the Laboratory is situated at the Naval Base in Cochin and the work is restricted to the Kerala coast. The Laboratory possesses a 50 ft. research vessel, *Conch*, fitted with modern oceanographic equipment.

Five schemes dealing with the studies on the hydrography, productivity, plankton, bottom fauna and bottom deposits of the Kerala Coast are currently in progress.

INDONESIA

The Progress Report for the quarter, October to December 1957, of the Sea Fisheries Service of Indonesia contains, among others, the following information.

Model Fishing Community Development Project

The Model Fishing Community Development Project at Kota-Baru, Southeast

Kalamantan, was nearing completion towards the end of 1957. This Project aims at creating a community whose individual members will have access to the modern developments in fisheries. Among the facilities which will be provided by the Project are: Boat-building yard, workshop for marine engines and other machinery, net-making yards and machines, fish landing centre, ice and cold-storage plant, transportation facilities, salting yards, artificial drying yards, canning plant, and fish-meal factory. The Project also includes a technological laboratory, training centres for fishermen and a dormitory for trainees. Community services such as water supply, electrification and fishermen's residential quarters, are to be provided.

On the successful completion of the Project at Kota-Baru, it is planned to undertake similar projects in other regions.

Biological Investigations

Early results of research on *Rastrelliger* indicate that 99% of the catch of the West Borneo area consisted of *Rastrelliger neglectus* and 1% of *R. kanagurta*. The catches during February 1958, compared with catches of previous months during the fishing season in 1957 - 58, showed a decline which is believed to be due to movements of the stocks of fish. Preliminary observations on the behaviour of the fish shoals are being recorded and the data on maturity and feeding habits have been accumulated.

Owing to technical difficulties Tuna research has been restricted but it is expected that this will expand as facilities improve.

Some interesting preliminary results have been obtained from exploratory trawling tests along the north coast of Central Java during September–October 1957. Potential shrimp grounds have been located in comparatively shallow waters and the development of useful industry may be anticipated. Biological studies on the occurrence of shrimp larvae in plankton tow-nettings are being carried on and plans are being prepared for exploratory trawling along the east coast of Sumatra. Arising from these investigations, work is proceeding on the preparation of a plankton calender for the area. Early studies on the clupeoid fisheries in E. Java are being undertaken and it is suggested that important fisheries based on the use of purse seines could be developed.

Investigations of vitamin A content of the liver oils of various species of sharks and studies of the occurrence and suitability for agar production of certain species of red seaweed are being continued. Studies on the biology of *Stolephorus heterolobus* are being undertaken at the Tegal Station in Central Java.

A new station has been opened at Tandjung Pinang in Central Sumatra and a survey has been initiated to determine the initial programme of work for the station.

Attention is also being given to the culture of pearl shell and attempts are being made to develop more efficient fishing gear for edible clams. So far the gear devised for this project has operated satisfactorily in shallow waters but technical difficulties have yet to be overcome to develop it for use in deeper waters.

Mechanization of Fishing Craft

Since 1950, the Sea Fisheries Service has to-date mechanized 279 vessels. Of these, 35 were used by the Service for research while 244 were distributed to fishery co-operatives, regional sea-fisheries institutions and fishing enterprises organized by veterans. More than 400 motorized vessels of medium and small sizes were also constructed by private boat-builders.

The fishing industry which was hesitant at the initial stages, has now been convinced of the benefits of mechanization. The demand for mechanized vessels is increasing and at present is much greater than the Sea Fisheries Service is able to meet.

Experimental Fishing

Experimental longlining for tuna was carried out in the Indian Ocean near Tapanuli, Northwest Sumatra, with *Bima*, a motor vessel of 20 tons capacity. The catch in 3 trips, totalling 10,701 kg. and valued at Rp. 32,251, consisted of 256 tunas, sharks, and sailfish.

Experiments were conducted with 'Otoshi ami' in the waters near Kota-Baru, the east coast of Java and Madura. The operations near Kota-Baru gave satisfactory results.

Experimental shrimp-trawling was conducted with the *Muna*, a 20-ton motor vessel, in the waters near Kota-Baru, Balikapapan, Samarinda and near the north coast of Central Java. The operations were supervised by Mr. T.H. Butler, FAO/ETAP Marine Biologist.

'Muro ami' was also tried near the Kangean and Sapeken islands.

Fisheries Training Courses

During 1957, four fisheries training courses were conducted. These were:

i. A one-year course for lower Sea Fisheries Extension personnel at Tjirebon. Of 25 participants, 23 completed their training successfully.

ii. A one-year course for lower Sea Fisheries Biological personnel at Jacarta. Of 26 participants, 23 completed their training successfully.

iii. A course for lower Fisheries Technological personnel at Pasar Minggu (Jacarta) with 16 participants.

At the time of reporting this course was still continuing.

iv. A series of three courses for navigators and engine drivers at Semarang, Surabaja and Medan. Each course lasted 3 months; the participants in 1957 totalled 80. In past years several hundred navigators and engine drivers have completed this course.

The Sea Fisheries Service in co-operation with the Navigation Service, has also trained navigators and engine drivers for the bigger motor vessels. Several officials after being trained as engineers are now working at the Institute of the Sea Fisheries. Some officials who undertook the navigator's course are now working on the research vessels of the Sea Fisheries Service.

In addition, during 1957, eighteen persons were sent abroad for special training. These were: 6 trainees under I.C.A. project; 2 trainees under Colombo Plan; 2 trainees under Unesco, and 8 trainees under Government project.

Socio-economic Activities

By the end of 1957, 251 fishery co-operatives with 35,355 members were registered. The total savings of fishermen deposited with those societies amounted to Rp. 1,221,904.99 while the assets of the societies were valued at Rp. 2,001,717.88.

In its extension activities, the Sea Fisheries Service urged co-operative societies to intensify their efforts in improving techniques for fishing, handling, transportation, processing and marketing of fish.

Formerly, the Sea Fisheries Service, by arrangement with the Co-operative Service, had direct management and control of the sea fisheries co-operative societies. By a recent arrangement, the former will henceforth be responsible for the technical supervision of these societies while the latter will look after the administrative and financial matters.

Foreign Technical Aid

During 1957, Indonesia received, in the field of sea fisheries, the following technical expert assistance from different aid-giving agencies: 1 Fish cannery expert from I.C.A.; 1 Fisheries specialist from I.C.A.; 1 Shrimp expert from F.A.O.; 2 'Otoshi ami' experts from I.C.A., and 1 Fisheries adviser from I.C.A.

JAPAN

Knotless Fish Net Made from Synthetic Fibre Popular

A knotless net, made of rot-proof synthetic fibres, has become popular among Japanese fishermen, according to a paper by a representative of the Japanese manufacturer to the International Fishing Gear Congress in Hamburg in October 1957.

The firm, which invented the nets in 1952, claims remarkable merits for them, and says they may eventually replace ordinary nets in Japan.

Pointing out that an ordinary net cannot be made without knots, the paper describes the making of the knotless net by a doubling process in which several single yarns are doubled together with twist by a machine.

Two or more of these doubled yarns are then again doubled and twisted into a strand in "Z" direction. This strand is then wound on the bobin of the netting machine.

Twine in the knotless net has an "S" twist of two-ply strands.

Special features of the knotless net include lighter weight and less bulk since as much as 50 percent of raw material can be saved; higher strength; less resistance to currents; easier to handle and no friction; less labour and smaller tackles; no damage to the fish; mesh size almost 100 percent exact; easier and more complete dyeing; and less adherence of dirt and microbes.

By a heat-setting process, the "S" twist in the twine is fixed in position and the twine becomes stronger by about 15 percent. Also, hard fibers become soft and soft fibres can be given suitable hardness.

Nets of nylon and similar yarns are dyed with commercial dyes, pigment colours, or coal-tar. (*Comm. Fish. Rev.*, 20 (2): 66, 1958.)

Efficient Kite for Trawl Fishing

In trawl fishing conducted by Japanese boats, the net mouth could not be made to open more than 1.5 to 2 meters in height. This would often result in failure to capture some of demersal fish, particularly prawn that might swim about on layers a little above the bottom. To remedy this, a type of kite was developed recently in Japan.

Encouraged with a marked success in commercial trawling as well as in field tests, description of the kite and results of the experiments were reported by a Japanese delegate at the FAO International Fishing Gear Congress held at Hamburg in October 1957. A paper has since been published and the full reference is:

Takayama, S. and T. Koyama (1958). Studies on Trawl Net – 1. A Net-mouth Stretcher working on Kite Principle. *Bull. Tokai Reg. Fish. Res. Lab.*, No. 19, 1-26 pp.

In trawling operations conducted during December 1957 to April 1958, it was confirmed that the net aided with the kite could open its mouth as much as 4 meters in height, resulting in about 30 percent increase in the prawn catch over another operated without the kite.

KOREA

Tuna Longline Fishing Venture

The initial success of the deep sea longline tuna fishing venture being carried out through the co-operative efforts of the Republic of Korea's Office of Marine Affairs' Fisheries Experiment Station, the Jae Dong Fishing Company, and the Office of Economic Co-operation (OEC) Fisheries Demonstration and Training Project, has created widespread interest in both the Government and the fishing industry. The Korean Minister of Commerce and Industry has published an advertisement advising fishermen with suitable boats to contact him personally if they are interested in this type of fishing. OEC Fisheries Branch personnel are discussing the problems of outfitting other boats of Korean registry for this type of fishing. If successful, and supported by the Government to enable owners to obtain supplies for their boats, this type of fishing in near and distant waters could rather quickly increase the foreign exchange earnings of the country.

The former U.S. Fish and Wildlife Service vessel *Jinam* (ex-*Washington*) was brought in to Korea under the ECA Programme January 1950. Some months after arrival she was operated by a Korean fishing company for a short time, then transferred to her present owner, another Korean fishing company. In 1951 the vessel was used to carry iced yellowtail tuna to Japan. Late that year attempts were made to carry live fish and eels to Japan, but the latter venture was not successful. After several years of inactivity, the OEC Fisheries Branch again held several discussions with the owner and local government officials in an effort to get the boat utilized. Up to this time she had been a liability to her owner and to the entire programme for improving fishing vessels and fishery methods. These discus-

sions resulted in an agreement on 15 May between the owner, the Government, and OEC that the vessel would be outfitted for longline operation under the Demonstration and Training phase of the OEC fiscal year 1956 Fisheries Project. The OEC Fishing Operations Adviser, in co-operation with the Fisheries Experiment Station, would assist in installing the equipment and training the crew in its use. The owner would put the vessel into condition and provide funds for operation of the vessel to fish for tuna on the deep-sea fishing grounds in the Southwest Pacific.

The vessel was ready for sea on 26 June 1956, but a number of difficulties both ashore and at sea hampered the vessel's operations. Reports from the vessel to the owner indicate that by 20 August about 50 tons of tuna had been caught and frozen southeast of Formosa.

The owner reports he has a verbal contract to ship up to 600 tons of fish from Singapore to the tuna cannery in Puerto Rico or Samoa by the end of December 1957. He, therefore, wants to keep the boat fishing in that area until the end of the year.

The success of Korea's first deep-sea fishing venture at this stage depends primarily upon the support given by the Government in making either British pounds sterling or dollars available to the owner in exchange for Korean hwan. (*Comm. Fish. Rev.*, 20 (1): 97, 1958.)

Trial Shipments of Frozen Shrimp and Tuna to U.S.A.

The South Korean fishing industry is preparing two frozen shrimp shipments and one frozen tuna shipment for the United States.

Introduction of shrimp trawling equipment, construction of shrimp trawls, demonstration and instruction in the use of trawls on existing vessels have been the major activities of Office of Technical Co-operation fisheries technicians during November 1957. A second trawl project, in co-operation with a private fishing company, has been initiated near the Pohang area. No conclusive results have yet been obtained because the "shrimp run" is late in starting this year.

A diesel engine training school at the Fisheries Experiment Station, Pusan, sponsored by the Korean Office of Marine Affairs, is training 19 students in the actual installation, operation, maintenance, and repair of diesel engines. At least two classes are planned to train Korean instructors who will then teach courses for fishermen in the fishing ports throughout Korea, according to a report of 5 December 1957, from the Office of Technical Co-operation in Seoul. (*Comm. Fish. Rev.*, 20 (2): 58-60, 1958.)

MALAYA

The quarterly Progress Report of the Fisheries Department, Ministry of Agriculture, Federation of Malaya, for the period, January-March 1958, contains the following information:

Fish Landings

Fish landings in the first three months of 1958 show a slight decrease on those for the same period of 1957. This is mainly due to the continuation of the North-East

Monsoon well into March, thus limiting the activities of the fishermen on the East Coast at a time when fish landings are usually high. Towards the end of March, however, there was an improvement in the South-East area although in Kelantan and Trengganu bad weather prevailed until the end of the month, fishing only being possible during quiet periods. Trengganu fishermen started to move south to Pahang and North Johore in the annual migration and with the cessation of the monsoon the number of these migrants will greatly increase. On the West Coast the 'pukat jerut' (purse-seine) boats from Pengkor have extended their activities to as far west as Pulau Jarak in search of 'kembong' (*Rastrelliger kanagurta*). A number of 'bubu' (portable traps) boats from Trengganu continued to fish off Penang and benefitted greatly from the higher prices paid locally for fish.

Tuna Fishing Firm To be Formed with Japanese Aid

An agreement has been arranged with a Japanese fishing firm for technical assistance and advice in establishing a M$ 2 to 5 million (US$ 730,000 – 1,800,000) tuna fishing venture, the Malayan Minister of Agriculture announced following a visit to Japan. He stated that two 300-ton tuna fishing vessels would be sent from Japan, probably to fish out of Penang or the Province of Wellsley. The venture will be financed by private capital and Malayan co-operatives would be encouraged to buy shares.

It is believed that the new firm's vessels will fish in the Indian Ocean and off the coast of Borneo, with the catch processed at a proposed cannery to be built in Penang. As most Malayan fishermen are inexperienced in deep sea fishing and are reported to be reluctant to spend more than a few days at sea, the fishing vessels will initially be manned by Japanese crews. (*Comm. Fish. Rev.*, 20 (1): 89, 1958.)

Freshwater Fisheries

In all parts of Malaya there is an upsurge of interest in pond culture of fish and many new ponds have or are being constructed. The present development is in marked contrast to the ill-fated and short-lived 'boom' in fish ponds in the early 1950's as the advice of the Fisheries Department is being sought in the majority of cases and the supervision provided by the officers on the freshwater section of the Department ensures that only schemes with a good chance of success are encouraged.

The Department has been supplying fry, free of charge, to persons who have constructed suitable ponds and many persons have availed themselves of this service. *Tilapia* (*Tilapia mossambica*) remain popular, as do 'Kalui' (*Osphronemus goramy*) and 'Sepat' (*Trichogaste pectoralis*), while 'Lampam jawa' or 'Tawes' is in increasing demand and promises to be among the most popular of pond fish.

The most impressive development in the quarter has been in the use of mining pools as ponds for rearing of fish. The Fisheries Department has pioneered research into this problem and has proved that many pools can quickly be rendered fit for fish culture. Little is known about biological conditions in mining pools and how these conditions change with age. The research branch is at present working on these problems which are of vital importance if the immense unexploited

potential of the mining pools is to be fully utilised for fish culture.

Marine Research

Work has now started on a programme of *Rastrelliger* research in which it is hoped that the factors affecting the 'kembong' (*Rastrelliger*) fishery of Malaya may eventually be determined. Arrangements have been made, with the co-operation of the Marine Department for the collection of sea water samples at various points in the northern part of the Straits of Malacca and preparations are under way for collection of plankton and recording of water temperatures in the area.

Experimental Fishing

The monsoon has prevented fishing experiments being carried out on the East Coast. Experiments in dyeing of nylon nets have been carried out by Fisheries Officer, North West, using special chemicals and the results are being applied to the nylon drift nets which the Department is employing in comparative fishing experiments.

The use of synthetic fibres for nets is gaining in popularity, particularly among drift net fishermen. The usual turbid condition of the water in the Malacca Straits does not permit increased catches to be effected because of the lesser visibility of the synthetic nets but other advantages such as handling qualities, ease of maintenance and resistance to deterioration remain and are universally praised by the fishermen.

Mechanization of Craft

The number of diesel-engined boats has continued to grow on both East and West Coasts. Three new boats have been fitted with diesel engines in the South East Zone as the fishermen prepare for the season after the monsoon and a considerable number of boats is nearing completion. In Malacca there has been a further increase in the number of powered vessels in the drift net fleet with both Japanese and English engines being installed. In the North West, 7 new inboard engined boats and 10 outboard engined boats have been registered, while in the North East Zone 17 new inboard engined boats were registered during January and February, all in Trengganu.

Island Fishing Bases

Two long houses for fishermen were completed at Pulau Redang in January. It is hoped that further development of this and other islands by establishment of jetties, fish and ice stores etc. will take place when funds are available.

Kelantan Fish Marketing Scheme

A total of 12,661.5 katties of fish were purchased during the first quarter of 1958 at a total outlay of M$ 2,129.01 while income form charges for towing fishing boats amounted to M$ 546. The total quantity of fish purchased, although higher than that for the previous quarter, is low because of the limitation on fishing imposed by the monsoon.

The Deputy Manager of the Scheme returned from Australia at the end of January and has since submitted a comprehensive report on the course on Co-operatives which he attended.

Overseas Training for Officers of the Fisheries Department

Tengku Ubaidillah bin Abdul Kadir, Distribution and Marketing Officer, left Malaya on 22 March 1958 for a two-week FAO/ECAFE Seminar in New Delhi, India, on Policies to Support and Stabilise Agricultural Prices and Incomes in Asia and the Far East.

Enche Salam bin Haji Ibrahim returned in January from a 6-week course on Fisheries Co-operatives in Australia.

Mr. Toh Weng Hong and Enche Harun bin Abdullah left Malaya in March for a year's training in Freshwater Fisheries at the Central Inland Fisheries Research Station, Calcutta, India.

Mr. Tham Teik Mun and Enche Abdul Rahman bin Tahir have left Malaya for a 6-month course on Fisheries work in Canada. This course will include training in fishermen's co-operatives, technology, marketing, etc. and it is hoped that the officers may visit Japan and Hong Kong before they return to Malaya.

Fishermen's Training Course

The first course for 1958 was started in February. Twenty fishermen, mostly from the East Coast, are attending this course which will be completed in April, and among them are 4 trainees who were selected in consultation with the fishermen's co-operative societies from Besut, Kuala Trengganu and Kuantan for training in engine maintenance and running of ice-factories.

Fishermen's Co-operatives

To date 26 fishermen's co-operatives have been established in North East Malaya, 16 in Trengganu and 10 in Kelantan while an increasing number of enquiries are being made by fishermen who are interested in forming or joining societies. The members of the societies have benefitted from the loans which have already been granted. The interest in fishermen's co-operatives is not by any means confined to the East Coast although the effort for establishing them is concentrated there. Malay fishermen on the West Coast are aware of the benefits to be gained by the uniting of their efforts and a number of inaugural meetings have been held to consider the formation of co-operatives.

The Hengwha Driftnetters Co-operative Society of Malacca is attempting to extend its activities by establishing its own ice factory and undertaking the handling of its own fish but both these projects are still in the formative stage.

NETHERLANDS NEW GUINEA

Mechanizations of Local Fishing Craft

During 1956 – 57, outboard motors were used in the mechanization of outrigger canoes of dug-out constructions employed in fishing in the Humboldt-Bay.

Over 40 of above-mentioned canoe-type crafts were equipped with Johnson, Evinrude and Mercury outboard engines, ranging between 5.5 to 30 h.p.

This mechanization resulted in an

increase of 50% (or about 75,000 kg.) of the annual catch.

Notwithstanding the mentioned increase, the price of fish stayed high, due primarily to the high cost of operation of the outboard engines.

The fisheries department is busy designing a small suitable fishing craft equipped with a diesel engine. The measure aims at economic exploitation of inshore fisheries and production of fish at prices the people can afford to pay.

PAKISTAN

Marine Laboratory To Be Set Up

The Marine resources of Pakistan waters have hitherto remained untapped and unexplored. The Government has approved the set-up of a Marine Laboratory on the Karachi Sea-coast for studying the habits, bio-nomics, development and biology etc. of the marine fauna. Besides augmenting the knowledge of the country's oceanic wealth, the research and investigations to be carried out at this Laboratory will be utilised in the development of fisheries and shell-fisheries and other ancillary industries.

As there are no facilities so far in Pakistan for training of personnel who will work at the proposed laboratory, training was requested abroad for the Research Assistant, Zoological Survey Department. The United Kingdom authorities arranged a year's course of training in the above field with the Scottish Home Department Marine Laboratory, Aberdeen, which was scheduled to commence in June 1958.

Construction of Fish Harbour Progresses

The work on the Fish Harbour Project at Karachi is proceeding steadily and many of the aspects of the project have now been completed.

The co-operative store and the fish market are almost ready for use. The electrical sub-station has been completed and the work is progressing on the residential quarters. The main Port-Trust bundh has been finished and the excavation of the harder layers of the turning basin is complete and more than half of the suction dredging of the basin has been done. Work has been commenced in placing the piles for the foundation of the laboratory building as well as the initial stages of the construction of the ice plant.

Mechanisation of Fishing Fleet

The mechanisation of Pakistan's commercial fishing fleet will soon get underway following the recent arrival of 70 Danish marine diesel engines under the U.S. International Co-operation Administration's commodity aid programme for Pakistan.

Fifty of the engines have been delivered to Karachi for installation in West Pakistan fishing craft and 20 have arrived in Chittagong for East Pakistan fishermen.

Fisheries Training Centre

A sum of Rs.69,610 has been sanctioned by the Government of West Pakistan for opening a fisheries training centre at Sheikhupura.

The Centre will impart training to the officers and Subordinates and will give fillip to the implementation of a number of fisheries development projects.

Training in Aquarium Fisheries

The Karachi Municipal Corporation has several development programmes and has provided a sum of Rs.3 lakhs for the construction of a modern national aquarium at Clifton. Besides, the Central Government is developing a new Federal capital near Gadap, about 30 miles from Karachi. Further, after partition several housing societies, residential areas and industrial zones have come up. As all these schemes are new, there has arisen the need for parks, recreation facilities, etc. Trained personnel were considered to be necessary for planning construction and maintenance of these, and training was therefore requested abroad for the Assistant Horticulturist and Incharge of K.M C. Aquarium and Honorary Secretary, Pakistan Aquarium Society. In response to the request, Ceylon arranged a 12-month course in the above field. Training commenced in February 1958.

PHILIPPINES

Raw Matertial Resources Survey

A raw material resources survey which started last 1 January 1958 and is estimated to last for a period of one year, is being undertaken in the Philippines to determine the extent and location of each of the raw materials available in the country. Depending upon the availability of such data including past and current utilization, exports, imports, the survey may shed light on the commercial feasibility of further utilization of underdeveloped raw material resources. The project covers the four raw material fields, namely: minerals, forestry, agriculture and fisheries.

The objectives of the survey are as follows:

1. To develop statistical and related information from primary sources concernig existing and available raw material resources of the country in terms of quantity, location and feasibility for commercial utilization in a form useful for:
   a) national economic planning,
   b) the guidance of current and prospective private investors, and financial institutions in determining the direction of credit,
   c) formulating resources policies from both utilization and conservation aspects.
2. To prepare a compendium containing the information obtained from the survey.
3. To prepare recommendations and measures needed for the complete coverage of the raw material resources of the country.

The conduct of the survey is the responsibility of the Office of Statistical Co-ordination and Standards, with the close collaboration of the Office of National Planning, and Industrial Development Centre, Office of the National Economic Council aud the pertinent offices under the

Department of Agriculture and Natural Resources, one of which is the Bureau of Fisheries.

Mr. Claro Martin, Chief, Fisheries Research Division, sits as Fisheries Specialist in the Management Committee which lays down the policies and plans to carry out the objectives of the project. Mr. Justo R. Montemayor of the same Division is the Sub-Chairman of the Technical Working Committee which executes the plans prepared by the Management Committee. Both men represent the Bureau of Fisheries.

Fry Bank Programme Gains Support

In order to insure a continuous supply of fish fry for stocking in inland waters to replenish depleted stock and bring such water areas to their full productive capacity to increase fish production, the Bureau of Fisheries has launched a fry bank programme. Fisheries Director Heraclio R. Montalban has appealed to provincial boards and municipal councils of fish fry producing provinces to include a stipulation in the granting of milkfish (*Chanos chanos*) fry concessions requiring concessionaires to donate to the Bureau not more than 5% of the milkfish fry and of other species caught in the concessions. The provincial boards of Pangasinan, Zambales, La Union, Ilocos Norte and Cagayan have already adopted resolutions giving full support to the fish fry bank programme.

The fry collected by the fish stocking team of the Bureau from the fry grounds and those donated by concessionaries are stocked in the different fish farms of the Bureau and in provincial and municipal fish nurseries selected as fish fry banks. When the fry stocked in the nursery ponds are big enough, they will be stocked in depleted lakes, rivers and other public waters. (*Fisheries Gazette*, May 1958, p. 42.)

"Fish Camera" Demonstrated

A new Japanese fish finder, "Fish Camera", was demonstrated on 30 April 1958, by Mr. Sumihiko Chino, a Colombo Plan expert; with the assistance of Mr. Tatsuzo Suzuki, FAO Fishery expert, board the Bureau of Fisheries' research vessel, M/V *David Starr Jordan* in Manila Bay.

The demonstration was undertaken to acquaint the technical staff of the Division of Marine Fisheries of the Bureau with the installation, operations and basic principle of the gadget. The party included Messrs Patricio Dinglasan, Victorino San Antonio, Antonio B. Baltazar, Simeon Ventura, and Eduardo Prevendido.

The instrument works on the same principle as the fathometer. It has a transducer that could be fitted temporarily or permanently under the hull through which high frequency sound waves are sent and received as they bounce on the ocean floor or after hitting underwater obstacles like seaweeds, planktons, or fishes. Whenever the transmitted sound strikes an object, the reflected sound or echo is magnified electronically and translated into signals which are registered on "wet type" paper tapes of the recorder located in the pilot house of the boat.

The device, especially designed for small water crafts, operates with a six-volt battery. It is simple to operate and could easily be installed on powered or non-powered fishing boats. (*Fisheries Gazette*, May 1958, p. 42.)

Seven Fishery Pensionados to be Trained in Japan

Through the intercession of Mr. Tatsuzo Suzuki, Fishery Officer of the United Nations now attached to the Bureau of Fisheries, seven (7) pensionados from the Bureau of Fisheries and the Institute of Fisheries, University of the Philippines, will undergo training on various phases of fisheries in Japan for a period ranging from four to six months. These pensionadoships cover free transportation expenses from Manila to Japan and back, board and lodging, clothing allowance and pocket money.

Messrs. Juanito B. Malig and Ignacio Fernandez will be trained by the Niho Shipbuilding Yard of Tokyo, Japan, in shipbuilding and fish processing, respectively; Messrs. Ernesto Quetulio and Simeon Ventura will undergo training in net making with the use of synthetic fibers at the laboratory of Nippon Gyomo Sengu Kaisha at Simunoseki and Messrs. Leonardo Sartorio and Eligio Aben in marine engines at the Akasaka Iron Works. Mr. Pedro Sims of the Institute of Fisheries, University of the Philippines, will also undergo training in the electronics laboratory of Kaiju Denki Co., Inc. at Tokyo, Japan, with emphasis on the construction, operation and repair of fish cameras and other electronic devices used in fishing.

These training grants, sponsored by private firms in Japan, are considered of prime importance in the development of the marine fisheries of the Philippines. It will pave the way for the use of modern equipment which are now extensively used in Japan. (*Fisheries Gazette*, May 1958, p. 45.)

Filipino Businessmen To Make Study Tour

A 15-person group representing different sectors of the Philippine fisheries industry visited Hongkong in July to study the co-operative marketing system there.

The project, which is spear-headed by civic-spirited persons and was granted official sanction by the local government, is the first of a contemplated series of study tours which may be undertaken in connection with acquainting the public, especially that portion engaged in the fisheries industry, of the workings of a co-operative marketing system. It is hoped that the socio-economic merits of the system, as may be gleaned from its role in the fisheries industry of Hongkong, will inspire this private sector, composed of owners of fishing vessels, brackish-water fishponds and fish and fishery products processing establishments, to rally behind whatever movement along that line which the Philippine Government may initiate in the future,

The study tour, lasting ten days, included lectures on co-operative management, administration and economics, and on-the-spot observations of the fish markets of Hongkong.

THAILAND

Marine Investigations

The Department of Fisheries of Thailand has announced that arrangements have now been completed to initiate investigations of the marine resources of the South China Sea and the Gulf of Thailand.

The project was proposed by Vietnam and Thailand to International Co-operation Administration (ICA) of the United States of America which approved it in June 1958. The purpose of the project is to conduct a study of the marine living resources of the South China Sea and the Gulf of Thailand, and to train as marine scientists the nationals of Vietnam and Thailand.

ICA will provide the necessary funds for the entire investigations while Vietnam and Thailand will provide the facilities related to dockage of the vessels, and office, laboratory, as well as residential accommodation for scientific personnel.

It is expected that the Scripps Institution of Oceanography at La Jolla, California, will undertake the investigations on contract basis. The operations will possible begin in January 1959.

UNITED KINGDOM

HONG KONG

The Quarterly Progress Report for the period January to March 1958 of the Fisheries Division, Department of Agriculture, Fisheries and Forestry, Hong Kong, contains, among others, the following information.

Fish Landings and Prices

The Fishermen had a very successful quarter's fishing. Weather conditions were favourable throughout the period under review. As compared with the corresponding quarter of 1957 there was an increase of 9%, with fresh fish landings showing an increase of 13.6% (from 164,337 to 186,786 piculs) while landings of salted/dried fish decreased by 7.6% (from 16,269 to 15,031 piculs). The landings in March, over 77,000 piculs, represented an all time high in monthly landings. The increased landings were mainly due to the good catches obtained by the mechanized deep-sea trawlers and Pa Teng junks, together with increased imports of fish from China mainland.

With the increased landings, the average price of fish dropped by 25% compared with the same period last year and 4.78% compared with the previous quarter. Average wholesale prices fell from 80 cents per catty, for the same period last year, to 60 cents per catty for the period under review.

Mechanisation of Fishing Craft

A total of 138 mechanised fishing boats (109 of which were newly built craft) were licensed by the Marine Department. At the end of the quarter, the strength of the mechanised fleet stood at 2,299 vessels.

Of the 109 newly built craft mentioned above, all but 13 were built in the Colony. The value of these 109 hulls alone (excluding the cost of the engines installed, stern gear and rigging) was reported to be HK$ 823,193.

Fishing Methods and Gear

The two inshore boats opertead by the Division continued to go shrimp and otter trawling. Two nylon trawls, made some time ago, were treated with tar. This had the desired affect of both making the nets heavier, with the result that they stayed on the bottom while being towed, and, at the same time, successfully overcame the problem of mesh deformation previously caused by the knots slipping.* A Japanese type pair trawl net was constructed, the idea being to compare the efficiency of this net with that of a comparable otter trawl.

Several local companies which operate British-registered steel trawlers have for some time had Japanese fishing instructors on board their vessels. With a view to studying the Japanese methods and, also, to ascertian to what extent the local Chinese crews have benefitted from their training, members of the Fisheries Division staff went to sea with the vessels belonging to two of these companies.

Fish Culture Activities

There was sufficient rain during the quarter to enable a number of the fish farmers of the New Territories to drain their ponds just before Chinese New Year, and then to refill them.

Some 2,400 piculs of locally produced pond fish was harvested and sold at prices varying between $120 and $350 per picul.

Imports of living freshwater pond fish from China rose from 400 to 600 piculs per day during January and February but fell back during March to the recent average of only 250 to 300 piculs a day.

Grey Mullet Fry

The capture of grey mullet fry in the coastal waters of the New Territories started on the 27th January. These fry were required for the stocking of Hong Kong brackish-water fish ponds. So far the season has been very disappointing and nothing like the number required to fully stock the ponds has yet been caught. The price paid by fish farmers have varied between 2 cents and 10 cents (an all time high) per fish.

A Fisheries Division vessel was used to tow professional grey mullet fry catching fishermen, in their sampans, to a number of different areas in the hope that it would be possible to find shoals of the fry. In addition, the Police De-

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* Tarring is not necessary for avoiding knot slippage or for keeping the net on the bottom. To the best of our knowledge, nylon nets in commercial use in northern Europe are generally not tarrep, although the Netz-und-Materialforschungs Institut in Hamburg has carried out some tests with tar and black varnish treatment of nylon trawls. On the other hand, certain fixed bag nets (such as stow-nets) are often tarred to give added stiffness, as well as protection against sunlight, etc. Tarring should also slightly increase the tensile strength of the twine, and perhaps, give some protection against abrasion.

The only possible deleterious effect of tar treatment, which is known so far, is the bad effect of phenol on nylon. If tar is to be used in nylon nets, it should be phenol-free.

Knots have recently been used for nylon twine which stop slippage. Slippage can also be avoided by heat treatment of nylon nets. Adequate care must however be taken not to over-heat the net which would reduce the tensile strength of the twine. —Ed.

partment permitted a number of these fishermen to enter the closed area at Shataukok in the hope that they would be able to find the fry there. Unfortunately, neither of these attempts proved successful.

Fish Fry Trade

Hong Kong dealers exported 2,345,600 fish fry, some by air and some by sea, to Singapore, Bangkok and Formosa.

For some months there had been no restrictions on the export of fry from China but, from the 10th March, a ban was imposed on the export of Bighead, Silver, Grass and Mud Carp fry. This was said to be due to shortages in China, with the result that all available fry of these four species were needed to stock their own ponds.

Co-operative Activities

During the quarter, 4 new Fishermen's Co-operative Societies were registered.

Loans totalling HK $ 226,510 were made from the Fish Marketing Organization's loan Fund to 208 members of Fishermen's Co-operative Societies while another $ 241,590 were lent direct to 302 individual fishermen.

SINGAPORE

The following information has been obtained during correspondence with the Chief Fisheries Officer, Singapore, on the question of the control of predatory species in fish ponds:

Fish Production for 1957

The production of the major fishing gear of Singapore has increased from about 9,500 tons in 1956 to about 13,600 tons in 1957. The increase was due mainly to increased catches of the 'kelongs' (fixed trap), offshore long-liners, drift nets and pair trawls. The 'kelongs' accounted for an increase of about 700 tons which was due mainly to heavy catches of *Stolephorus* spp. The increased catches of the drift nets amounting to about 1,000 tons were due partly to increased availability of species of *Scomberomorus* and partly to increased fishing intensity of the nets resulting from the better condition of the outboard engines and increased efficiency of the fishermen who had been trained by the Fisheries Mobile Unit to maintain and repair their engines. The increased catches of the pair trawls were due to (a) an increase in the number of units and (b) the availability of better grounds.

Tea-Seed Cake to Kill Predators in Fish Ponds

Tea-seed cake is a dried clay-like substance with tea-seeds embedded in it. This product was formerly used by Chinese women to make a strong "dark brown brew" to clean their hair. The Chinese fish culturists in Singapore

also used this tea-seed cake to make a strong brew to kill the predators in their ponds before stocking them with carp fry. It is most effective for shallow ponds varying from 3 to 5 feet in depth and the rate of application is about 1 lb. of tea-seed cake per 25 sq. feet of pond surface. This fish poison has been found to be much cheaper and more effective than tuba root (*Derris* sp.) in dealing with the usual predators such as *Ophiocephalus* spp.

Recently it was found that the yield of prawns in the prawn ponds in Singapore dropped considerably and the cause was traced to the large numbers of *Tilapia mossambica* which were breeding in the wild state in the river running through the swamps where these prawn ponds were situated. Tea-seed cake was used at the rate of between 30 to 40 lb. per acre of prawn pond. It was found to be effective if the ponds were drained partially before application. It was estimated that the effective concentration was probably 100 lb. per acre of prawn pond. By the widespread use of tea-seed cake at 3 monthly intervals in this area of prawn ponds, the population of wild *Tilapia* has been cut down to a point where its effect as a predator is negligible.

The following records are reproduced to show the effect of tea-seed cake on the population of *Tilapia* in the experimental prawn ponds (area about 14 acres):

Date of application of Tea Seed Cake	Weight of *Tilapia* found in ponds (Katies)
15.2.55	211
27.5.55	131
24.9.55	112
20.1.56	106
2.6.56	45
10.11.56	77
24.3.57	9
19.9.57	18
31.12.57	26
25.5.58	11

It will be noted that the population has decreased considerably. The stock of *Tilapia* in these ponds is a reflection of the level of population intensity of *Tilapia* in the river from which these ponds draw their water supply.

Dr. Tham Ah Kow emphasises that these observations are essentially preliminary in character but it is hoped that as opportunity permits, more precise experimentation can be undertaken.*

UNITED STATES OF AMERICA

HAWAII

Oceanography with Dry Feet

The first known attempt to conduct oceanographic surveys in the open ocean from a helicopter was completed on Thursday by the Pacific Oceanic Fishery Investigations (POFI) and the

* Tea-seed Cake [Cha-chai (Catonese)] is also available in Bangkok and is priced at US. 20 cents per kilo.—Ed.

Kaneohe Marine Corps Air Station. The basic test was to determine whether the helicopter could complete the same mission as a surface ship and the results were a resounding success.

The survey extended from 50 miles north of Kaneohe to 50-miles south with one refueling stop. There were three scientific objectives—estimate the abundance of school, collect samples of seawater, and measure the water temperature. Each was successful.

In order to estimate fish and bird abundance, the "chopper" cruised at 50 feet above the sea, providing excellent visual scouting. There were no fish schools over most of the track, but about 40 miles north of Kaneohe several were sighted and birds were abundant. This information was relayed to the commercial fleet.

Seawater samples and temperature measurements were made at predetermined stations identical to those occupied by POFI vessels when they conduct an "Oahu monitoring survey". When the helicopter came on station, she stopped, and let down to about 20 feet above the sea. Devices to collect a water sample and measure temperature were then lowered. Time on station was about one minute, and all stations were successfully occupied.

During this operation, the "chopper" was escorted by a "navigator" plane". This was necessary because helicopters do not carry as standard equipment the apparatus necessary for precise over-water navigation.

There are three important to aspects the problem of helicopters versus vessels for certain oceanographic missions. One is cost. The just-completed survey would take a POFI vessel about 36 hours at an operational cost of over $ 1,000. The "chopper" costs about $ 90 an air hour, or about $ 450 for the operation. The second is the speed. The vessle takes 36 hours and the helicopter takes 4 or 5 hours. The shorter time period enhances the value of the data because time changes in the ocean are virtually reduced to zero.

This is particularly important with respect to birds and fish. These can move faster than a vessel, so one never knows if the same schools are seen twice. From a helicopter, there is on question. In the present instance, the survey was completed in a short time during daylight, permitting a nice correlation between fish and ocean observations. A vessel makes part of its survey at night when fish and bird observation is impossible, thus reducing the value of the survey.

A final factor, of course, is the type of observations. Obviously, a helicopter cannot do everything that a ship can, but it can do much more than was done in the present case, and very possibly the future will see the helicopter as the vehicle of choice for many oceanographic surveys.

Very likely the success of ocean's survey with helicopter will depend in large part, as it did in the present case, on the skill of the Captain and his associates.

New Ocean Current and Tuna in the Marquesas Studied

The vessel *Hugh M. Smith* of the U.S. Fish and Wildlife Service returned to Honolulu on Monday 23 June after an 88-day, 10,800-mile expedition in which

3 weeks were spent with the vessel *Horizon* of Scripps Institution of Oceanography, in a study of a newly discovered ocean current, the Equatorial Undercurrent. These investigations were part of the International Geophysical Year programme and were conducted about 1,500 miles southeast of Honolulu.

A new instrument and a new method were employed in these investigations. A current meter, lowered over the side of the drifting vessel, transmitted back to the ship through a conductor cable an electric signal which indicated the apparent direction and velocity of the ocean current. This information was corrected for the ship's drift in order to calculate the true current. To measure the ship's drift, it was necessary to have a fixed reference point. For this purpose deep parachute drogues, attached by wire cable to surface buoys, were placed at depths of about 3,000 feet; also other surface buoys were actually anchored to the bottom where the depth was 2.5 to 3 miles.

From the results obtained, this new current, which was first discovered by the Fish and Wildlife Service about 4 years ago, may be described as a thin ribbon of fast-flowing water—a veritable river in the sea—moving eastward along the Equator beneath a shallow surface layer of westerly flowing South Equatorial Current. This "river" was about 200 miles wide from north to south and between depths of 100 and 500 feet at the longitude where it was studied. It occurs in a part of the Pacific Ocean where only westerly currents were previously thought to exist.

FAO ACTIVITIES

MEETINGS ATTENDED

Dr. D.B. Finn, Director of Fisheries Division, attended the 10th Meeting of the *International Whaling Commission*, the Hague, 23 to 27 June.

Dr. G.L. Kesteven, Chief, Biology Branch, attended from 5–8 May the Fifth Session of the *International Advisory Committee on Research in the Natural Sciences Programme of Unesco*, Moscow.

Dr. E. Hess, Chief, Technology Branch, attended the 13th Session of the *ECE Working Group on Transport of Perishable Foods*, Geneva, 5–8 May.

F.E. Popper, Chief, Economics and Satistics Branch, attended the meeting of *OEEC Working Party No.8 (Fisheries)*, Paris, 5 May, as Observer.

Sydney J. Holt, Chief, Research Programme Section, Biology Branch, attended the Annual Meeting of the *International Commission for the Northwest Atlantic Fisheries*, Halifax, 3–15 June. He discussed matters relating to the programme of the Biology Branch and questions regarding fisheries statistics on behalf of the Economics Branch. He was co-opted to participate in the work of several of the sub-committees and working parties of the Standing Committee on Research and Statistics. His work was also concerned with problems in population dynamics.

TECHNICAL ASSISTANCE

Training Centre Specialist for India

Mr. Raphael Ruppin (Israel) arrived in India in April 1958 on his six-month assignment as FAO/ETAP Fisheries Training Centre Specialist.

His terms of reference are "to advise the Government and give instruction on practical fishing courses at the already established training centres, and to organize and hold new training centres as would be needed by the Government".

Mr. Ruppin is an Israel citizen and prior to this assignment has been since 1950 Director of the Government Fisheries School, Michmoret, Israel. As Director of this school he is responsible for planning, supervising and co-ordinating all fishery vocational education in Israel. Also, concurrently, he has been assigned lately as Special Government Commissioner for Fishery Development in the Red Sea Area. From 1947 to 1950 he was General Secretary of the Michmoret Fishery Co-operative and was responsible for the direction and management of the Co-operative's operation and financial affairs. From 1946 to 1947 he worked as master fisherman and Secretary for the Michmoret Fishery Co-operative. Mr. Ruppin was also awarded a fellowship by FAO in 1955 to broaden his experience in fisheries training facilities in several Northern European countries and in Italy. He reads, writes and speaks Hebrew, English and German; reads a little French and Dutch.

ETAP Marketing Specialist for India

Dr. Carlos Gonzalez (Argentine) arrivd in India in May 1958, on his 8 months' assignment as Fish Marketing Specialist.

He will advise Central and State government authorities on fish-marketing development and on their current field programmes; conduct surveys of fish-marketing conditions and make recommendations for the more efficient utilisation, distribution and sale of fish products; and also advise on and assist in the promotion and operation of specific fish-marketing schemes based on very small-scale, close-range fishing operations involving the use of simple collection, transport and storage arrangements, and the distribution and sale of fresh fish in ice or dried fish.

For the last twelve years Dr. Gonzalez has been Chief of the Economics and Statistics Section in the Directorate-General of Fisheries in Buenos Aires. He has had previous experience of FAO activities: in 1951-52 he was assigned to the Government of Ecuador to assist in the development of their dried fish industry, and he has been an instructor at two Fisheries Training Centres held in Latin America.

Fisheries Technologist Completes Assignment in Thailand

Mr. Gudmund Sand of Norway has completed about 2.5 year's assignment as FAO Fisheries Technologist working with the Fisheries Department Technological Laboratory in Bangkok. Mr. Sand's terms of reference were to advise and assist the Government in the introduction of improved practices of fish handling, preservation and distribution, including methods of quality testing and procedures for quality control of fishery products, and to undertake a study of present methods of fish preservation including dried-salted fish, boiled fish, fermented fish pastes and sauces, fish meal and fish flour.

During his stay in Thailand, Mr. Sand assisted the Department of Fisheries in organizing a Section devoted to Technological work and helped establish a Technological Laboratory, including the training of members of the staff. In the field of salted dried fish production, he has established the basis for more uniform quality. He has made particular studies of the possibilities for fresh fish distribution and canned fish production.

An interim report has already been submitted for consideration by the Thai Government and Mr. Sand spent 2-3 weeks at FAO Headquarters ie Rome preparing his final report on the assignment.

Hilsa Expert for Pakistan

Mr. Gerald B. Talbot, Chief, Middle Atlantic Fishery Investigations for the U.S. Department of the Interior, has arrived in Pakistan on a short assignment as FAO/ETAP Fisheries Officer.

Mr. Talbot's duties are to advise the Government of Pakistan on the development of its biological research activities directed towards the location, identification and appraisal of the marine and brackish-water fishery resources; the expert will concern himself especially with the problems of the stocks of *Hilsa* and will pay special attention to the study of existing fish ladders and the possibility of their improvement or the need for building new ones.

In his permanent position at the Fisheries Research Laboratory in Beaufort, North Carolina, U.S.A., Mr. Talbot is responsible for the planning and supervising of studies of the life histories and fluctuations in abundance of shad, striped bass, blue crabs and other species of fish.

DOCUMENTS AND PUBLICATIONS

The Fisheries Division of FAO is now producing a mimeographed ***Current Bibliography for Fisheries Sciences*** and three sections of the Bibliography have now been distributed covering some 714 references with appropriate author, taxonomic and geographic indices.

This Bibliography is available on request from the Fisheries Division, FAO, Rome, and recipients are requested to assist in the attempt to provide complete coverage of world literature on the subject to be issued with the least possible delay.

The Division would be grateful to receive annotated references or reprints of publications to ensure prompt inclusion in the Bibliography and to assist in any other ways which become apparent as the project develops.

FAO Fisheries Division, Rome, has recently issued a revised and augmented edition of the ***List of Films on Fisheries and Related Subjects*** first issued by Technolgy Branch in May 1953.

The FAO Fisheries Division is interested in promoting the use of films related to the field of fisheries which could assist in stimulating increased consumption of fishery products and in exchanging international knowledge about fishing methods and fish processing. This list is an attempt to assemble for distribution to fisheries workers all information which FAO now has on hand. The list has been compiled from film catalogues, fisheries trade and Government publications etc; but cannot provide a complete coverage or full information on all films. However, it is hoped that it will serve to bring to the attention of fisheries workers most of the films available in their or related fields.

The addresses of the distributors of the films listed are given on pages 93 - 104 of the list as well as reference to the films by number. Any enquiries related to the films listed should be addressed directly to the distributor or producer mentioned in the review. Only where such attempts have been unsuccessful should enquiries be directed to FAO. The Organization owns a certain number of fims for use at Training Centres etc. These may occasionally be made available for international fisheries meetings also. In so far as films from Canada, France, the United Kingdom and the United States of America are concerned, it will often be possible to obtain some of these on a loan basis from the local embassies legations or consulates.

Attention is called to the fact that films on sport fishing or strictly biological films have normally not been included in the list.

The FAO Fisheries Division would welcome any additional information regarding the films listed, as well as information on other technical films of similar subject matter.

Other publications issued are:

IPFC Current Affairs Bulletin,

World Fisheries Astracts, Vol. 9, Nos. 2 and 3, in English and French.

Sea Fish marketing in the Federal Republic of Germany. *FAO Fisheries Study*, No. 6, Spanish. This publication has now been released in all three languages.

Application of Science to Inland Fisheries, by E.D. Le Cren, *FAO Fisheries Study*, No. 8, English edition. The French and Spanish versions are planned for 1959.

Zooplankton, Factors affecting its Abundance and Distribution with special Consideration to the Relation to Phytoplankton and Fisheries, by T. Laevastu (revised edition, mimeo).

The Oceanographical Conditions for Life and abundance of Phytoplankton considered with respect to Fisheries, by G. L. Kesteven and T. Laevastu (revised edition, mimeo).

An Elementary Guide for the Use of those contemplating the Development of a Programme of Research in Oceanography for Fisheries Purposes (mimeo).

IPFC AFFAIRS

STAFF MOVEMENT

Mr. J. A. Tubb, Regional Fisheries Officer, and *ex-officio* Secretary of the Indo-Pacific Fisheries Council serviced the 27th meeting of the Executive Committee held in Saigon in May 1958 and attended by ***Dr. K. Kuronuma,*** Chairman, and ***Dr. Tham Ah Kow,*** Vice-Chairman.

Owing to pressure of business arising from the recent Conference on the Law of the Sea, ***Dr. Panikkar,*** Ex-Chairman of the Council and the Fisheries Development Adviser to the Government of India, was unable to attend the meeting.

After the meeting, Mr. Tubb spent a week in Phnom Penh discussing fisheries matters with government authorities.

Dr. M. R. Khan, Assistant Regional Fisheries Officer, and Technical Secretary for Panel B of Technical Committee II was absent from Bangkok on tour during June and July. Dr. Khan visited Fisheries Division, Rome, and had discussions with fisheries officers and government authorities in Pakistan, India, and Burma before returning to Bangkok.

Mrs. A Soulier, Technical Assistant and IPFC Conference Officer is at present on leave in Europe. She expects to return to Bangkok early in September 1958. En route to Europe Mrs. Soulier called at Colombo for discussions on arrangements for the 8th Session of the Council with Mr. L.F. Tisseverasinghe who has been appointed Officer-in-Charge of local arrangements by the Fisheries Department, Colombo.

COUNCIL SESSION

Arrangements are well in train for the holding of the 8th Session of the council at Royal College, Colombo, from the 6-22 December 1958.

Member Goverments have been invited to send delegations. The Governments of Laos, Portugal, and Germany, and a number of international organizations have been invited to send observers. Several national organisations in the host country, which is Ceylon, have also been invited to send observers.

Member Governments have been requested to report on the status of the fisheries industry in their respective countries and actions taken by them on the recommendations made at the 7th Session of the Council.

In addition to the Report on the Status of the Industry and the Reports of Technical Committee I (Biology) and Technical Committee II (Technology), many interesting technical papers will be presented at the Session. A symposium entitled "Fish Behaviour with particular reference to pelagic shoaling species" will also be held at this Session (See immediately following sub-head).

Symposium on Fish Behaviour

Following the established practice of the Council, a symposium will be conducted during the 8th Session. The subject for this symposium, as decided at the 7th Session, is Fish Behaviour, with particular reference to pelagic shoaling species.

The prospectus for this symposium has recently been distributed to scien-

tists actually engaged in research on this subject, to obtain experience papers for presentation at the symposium. The purpose of holding this symposium is proposed to be to obtain a consensus of opinion on the purposes for undertaking investigations into fish behaviour and methods by which such investigations should be carried out. In order to discuss the foregoing matters effectively, sufficient attention will be given to an understanding of the mechanisms of behaviour.

It is proposed that the discussions should be based on two sets of papers, of which the first will be background review papers prepared by special consultants and the second will be experience papers based on current research in this field.

FAO has undertaken to arrange for the preparation of background papers on the following subjects:

(i) Components and determinants of behaviour.

(ii) Patterns of behaviour.

(iii) Methods of research.

(iv) Terminology in behaviour research.

It is hoped also to provide a bibliography.

The first three papers will constitute essay reviews of literature and will be distributed to participating countries as far in advance as possible.

It has been arranged with Dr. F.R. Harden Jones of the Fisheries Laboratory Lowestoft, to prepare a background paper on Responses to Stimuli. Professor F.E.J. Fry of the Ontario Fisheries Research Laboratory has undertaken to prepare the background paper on Methods of Fish Behaviour.

It is proposed to complement Professor Fry's paper by a tabulation of research in the field of fish behaviour being carried out in the world to-day. Fisheries institutions have been addressed requesting a statement setting out the projects of research, the names workers engaged in these projects, and of some brief notes on the kind of equipment used and the methods employed by them. The information resulting from this request would be compiled into a general paper for the world in a systematic pattern; the paper will be fully indexed.

Participating countries are invited to present papers giving an account of their own experience in particular lines of research. Authors of these papers are asked not to review past work but rather to orient their papers to contributing to the purposes of the symposium as described above.

Papers should be sent direct to the Indo-Pacific Fisheries Council, Regional Office for Asia and the Far East, Bangkok, Maliwan Mansion, Phra Atit Road, Thailand. They should be typed, double-space on one side of the paper, and submitted in duplicate.

IMPLEMENTATION OF COUNCIL RECOMMENDATIONS

Rastrelliger Seminar

Arrangements are now well in hand for the Seminar on the Methodology and Techniques of *Rastrelliger* Research recommended at the 7th Session of the IPFC and invitations to interested Member Governments have been issued for the Seminar which is

scheduled to be held in Bangkok from 20 October - 28 November 1958.

Technical Committee Activities

Newsletters issued by the Technical Secretaries to the members of Technical Committees and their Panels have been well received and the response has shown marked improvement. Technical Secretaries have initiated action for the preparation of the draft reports by the Technical Committees for presentation to the 8th Session of the Council.

COUNCIL CORRESPONDENT

Advice has been received that ***Mr. Alan Leavett,*** First Secretary, British Embassy, Bangkok, has been appointed U.K. Administrative and Bibliographic Correspondent of the Indo-Pacific Fisheries Council. Mr. Leavett replaces Mr. A. Maddocks as Administrative Correspondent and Mr. D.W. Le Mare as Bibliographic Correspondent.

PERSONALIA

Dr. Ernest Hess, Chief of Technology Branch, Fisheries Division, FAO, for the past five years, retired as of 18 July 1958.

Born in Zurich, Switzerland, and a graduate of the Swiss Federal Institute of Technology, he went to Canada in 1923 and took an M.A. degree at Queen's University, Kingston, Ontario, and a Ph.D. degree at McGill University, Montreal.

For some 20 years he was engaged in bacteriological research work at the Atlantic Fisheries Experimental Station of the Fisheries Research Board of Canada, Halifax, Nova Scotia, where, in 1942, he became Chief Bacteriologist. He was also Associate Professor of Bacteriology (Fisheries) at Dalhousie University, Halifax, and Special Lecturer on Fish Processing at the Ecole Superieure des Pecheries (Laval University) at Ste. Anne-de-la-Pocatiere, Quebec. From 1947 to 1949 he was Director, Fish Inpections Laboratories, Federal Department of Fisheries, Halifax.

During the course of his career he served on many public and technical bodies, and is the author of studies and papers on a variety of subjects, including bacteriological research on fresh, chilled, frozen, smoked, salted and canned fish, canning technology, fish plant sanitation, etc.

He joined Fisheries Division, FAO, in 1949. As Chief of Technology Branch he has been in charge of work on fishing boats, gear, methods, and fish processing, as well as supervising the work of FAO's fishery experts on assignments in various countries of Europe, Asia, Africa and the Americas. In the course of his duties he has travelled widely in these continents.

On separation from FAO, Dr. Hess was appointed Fisheries Adviser to the Federation of the West Indies. He will take up his duties around 1 September.

His services to the West Indies near being provided by the Canadian Government through the Canadian Technical Co-operation Service. In his present position, he will be responsible for organizing and running fisheries schemes for the Government in the West Indies.

Dr. William F. Hampton, Chief of Processing Section of FAO Fisheries Division, since 25 September 1955, resigned effective end June, 1958.

Dr. Hampton is a graduate in chemistry and physical chemistry of the Canadian Universities of Dalhousie, Halifax and McGill, Montreal. From 1935 until 1943, he worked as Chemist, Chief Chemist, and then as Acting Director, of the Fisheries Research Laboratories, Department of Natural Resources, St. John's, Newfoundland. He then joined the Seafoods Division of the General Food Corporation, Boston, Mass., USA., as Director of Research and Development. On leaving the Corporation in 1951, he became Manager of the Birdseye Fisheries Laboratories in White Plains, New York, and held this post for four years.

On separation from FAO, Dr. Hampton left for U.S.A. to take up a position with the fish processing industry there.

Dr. Deogracias V. Villadolid formerly Director of Fisheries, Republic of the Philippines, and lately Professor of Zoology and Dean, Institute of Sciences, Araneta University has now joined the Institute of Science and Technology (formerly Bureau of Science) as Supervising Scientist (March, 1958).

In a recent letter Dr. Villadolid expresses his view that the new appointment will afford him more opportunity to participate actively in scientific research, particularly Industrial Ichthology and Fisheries and Economic Limnology.

Mr. Hasanuddin Saanin Chief of the Laboratorium Perikanan Darat, Bogor, has been awarded an ICA Fellowship to study inland fisheries and fish culture in the U.S. for a period of 4 months commencing July 1958.

Mr. Saanin has been intimately associated with the work for the Council for many years and has been an active member of Technical Committee I, particularly in connection with the Inland Fisheries Panel. Mr. Saanin is now Chairman of Technical Committee I.

In a memorandum order issued recently, Director Heraclio R. Montalban designated ***Mr. Guillermo L. Ablan,*** Fishery Technologist and Chief, Brackish Water Section, Division of Inland Fisheries, to take charge, concurrently, of the oceanographic research laboratory at Lucap, Alaminos, Pangasinan. The oceanographic research laboratory had been constructed by the Provincial Government of Pangasinan. In a resolution adopted by the Provinical Board of the province, the Bureau of Fisheries was given authority to use the laboratory and its facilities for the conduct of oceanographic and other fisheries research work.

As Fishery Technologist in Charge of the oceanographic research laboratory, Mr. Ablan will take charge of all work in the laboratory and supervise the activities of subordinate personnel assigned in the laboratory. It was learned from Mr. Ablan that the first phase of the work in the laboratory will be the collection of fish specimens for the aquarium.

Mr. D.R. Niven, Fisheries Officer, South West Malaya, retired under the Malayanisation Scheme in February. Mr. Foo Fah Lin, Senior Fisheries Assistant is now Acting Fisheries Officer, South West.

Mr. Padh Tavaranusorn, Chief of Socio-economics Section, Department of Fisheries, Thailand, is shortly proceeding to U.S.A. on an ICA fellowship. Mr. Padh has been registered as a resident student at the Oregon State College where he will take up a two-year course in Economics leading to Master's degree.

Dr. K.F. Vaas, formerly of the Laboratory for Inland Fisheries, Bogor, Java, and who recently returned to Holland on the termination of his service with Indonesian Government, has been appointed with effect from 1 July 1958, as Director of the Laboratory for the Investigation of waters in the Zeeland-Delta.

This new laboratory is attached to the new Hydrobiological Institute of the Royal Academy of Sciences of the Netherlands.

In addition to the appointment of Dr. Vaas, scientific staff including a chemist, a plant ecologist and a biologist have been appointed and further appointments are envisaged in the future.

The laboratory will work in close contact with Den Helder and with a new limnological institute to be created at Loenen between Amsterdam and Utrecht.

The primary objective of the new laboratory which will be situated at Ierseke, will be to observe the changes of flora and fauna of the Delta-waters and shallow muddy coasts following the construction of the immense new dykes and reclamation works in this region.

Dr. William F. Thompson, having attained the age 70 in April 1958, relinquished as of 1 July 1958, the directorship of the Fisheries Research Institute of the University of Washington to ***Dr. William F. Royce.*** Dr. Thompson will remain associated with the University's College of Fisheries on an advisory and research capacity where his chief concern will be the editing and preparation for publication of the scientific data and studies of the Fisheries Research Institute.

Before taking up his present position, Dr. Royce was in charge of Alaska fishery research for the U.S. Bureau of Commercial Fisheries. His early investigations were concerned with North Atlantic problems. Later, he accepted a senior position on the biological staff of the Pacific Oceanic Fishery Investigation at Honolulu. In 1955 he was promoted to the post of Chief of Fisheries Research for the Fish and Wildlife Service in Alaska, where his work since has won the admiration of the fishing industry as well as of scientists.

While in POFI Dr. Royce participated at the 4th Session of the IPFC as alternate delegate for U.S.A. He was also a member of the Council's Technical Committee I during 1952 - 54.

In addition to the change in its direction, the Fisheries Research Institute, which has been an element of the Graduate School of the University of Washington, was shifted to the College of Fisheries when it was raised from the status of School of Fisheries in the University's table of organizations, ***Dr. Richard Van Cleve,*** Director of the School, advancing in rank to dean of that College.

CURRENT READING

On the Dynamics of Exploited Fish Populations, by R.J.H. Beverton and S.J. Holt, *Fishery Investigations*, Series II, Volume XIX, *Ministry of Agriculture, Fisheries and Food, U.K., Her Majesty's Stationery Office, London.* 1957, pp.1–533, plates, figures and tables. (£6.6.0).

The report describes investigations carried out between 1947 and 1953 into the dynamics of populations forming the natural resource on which depend the demersal fisheries of the North Sea. In 1947, the Standing Advisory Committee, set up by the International Overfishing Conference of 1946, found that it needed more precise information on past changes in the stocks of fish, and more certain predictions of what effects there would be from one measure of conservation or another. The time was evidently ripe for a thorough analytical treatment of the subject, sufficiently good to make use of all existing information. It became necessary to predict the effects of changes in the amount of fishing, in mesh of nets, of variations in growth rate due to thinning out of the stocks by fishing and of variations in the rates of reproduction and survival; in general, to determine what effects are of a major order and what minor, and to estimate, for the industry and for governments, the magnitude of the benefits that can be achieved by conservative fishing.

The report consists of four parts: Part I deals with the fundamentals of the theory of fishing, illustrated by analysis of a trawl fishery; Part II deals with the extensions of the simple theory of fishing; Part III is devoted to the estimation of parameters; and Part IV discusses the use of theoretical models in a study of the dynamics and exploitation of fish populations. In addition, there is a resume, bibliography and author index as well as a subject index.

The task to the authors of the report was a considerable one. To consider all the factors in one comprehensive equation demands considerable patience. The number of factors that govern yield, and the variety of fishing, requires the use of a good many algebraic terms. Nevertheless, it will be found that the theory used is relatively simple, and once the notation is mastered this is not a difficult paper to read, especially with its generous provision of simple graphs, and ample worked examples.

Although it will be found that the paper is directly relevant to the better use of the stocks of fish in the North Sea, it is not offered on so narrow a basis, but as a guide in conservation problems over a larger field. Plainly the first application will be in fisheries, but it is hoped that the methods and ideas will also find applications in the study of other natural resources.

The Physiology of Fishes, edited by Margaret E. Brown, Vol. 1: Metabolism, pp. xiii + 447, 12 dollars, Vol. 2: Behaviour, pp. xi + 526, 14 dollars, (*Academic Press, Inc., New York, 1957*).

Dr. Margaret Brown does not tell us how she came to have the idea of asking a number of authors to write

upon different aspects of the physiology of fishes. It was a very good idea, and the result has been two volumes that will be of value and delight to many general zoologists as well as to those interested especially in fishes and fisheries research, to whom she says they are specially directed. Although there are no close links between the various sections, there is evidence that Dr. Brown has unobtrusively played a considerable part in editing the whole. In particular, she has herself set for each author the extent of his contribution – an excellent plan, which has ensured special emphasis on fields often neglected or of special interest because of recent work. Dr. Brown's own article on "Experimental Studies on Growth" is a good example. She has succeeded in collecting many fascinating facts about the determination of the age and growth of fishes and relating these to general biological problems.

Inevitably, any book that deals with the physiology of an arbitrarily chosen group of vertebrates will seem in some respects disjointed. One regrets particularly that neither amphioxus nor ascidians have been considered to be 'fishes'. Without them the discussions of the evolution of, for example, digestion and the endocrines inevitably lose some of their interest – though both remain fascinating enough.

The depth of the treatment and extent of literature quoted vary somewhat. There are more than 125 references on the swim bladder, but only eight on colour changes. Generally speaking, the work will serve to give an introduction to the special features of the physiology of the various organ systems of fishes, and in some cases, but not all, will provide a critical discussion of the current problems.

This work together with other which have appeared recently emphasize that comparative physiology is growing up into an extensive discipline contributing greatly both to theoretical and practical biology.

Dreosti, G.M.; C.A. Edwardes and M.K. Rowan. 1. Use of sodium bicarbonate in brining hake 2. Reuse of salt for salling hake. *Annual Report of the Fishing Industry Research Institute, Cape Town, South Africa*, 9:10-11, 1955-1956.

1. Use of sodium bicarbonate in brining hake. A study was made to learn if the treatment of hake with sodium bicarbonate before or during salting would result in more tender fish after desalting.

Experimental. – Freshly caught, headed, and gutted, hake, each weighing about 1.5 pounds, were placed in small bins with salt below, between, and above the layers of hake and covered with a saturated brine. A second and third lot of hake were similarly treated, but with salt that contained 2 percent and 6 percent sodium bicarbonate, respectively. All of the lots of salted hake were held at 40° F.

Results. – After each of the lots had been salted for 7 days, the hake were filleted and desalted for 6 hours in running water. The control lot that had been preserved with salt only, had a more fishy odour and a slightly tougher or more rubbery texture than lots 2 and 3. Af-

ter hake from the control lot had been cooked in 5 times its weight of water, it was slightly tougher than similarly cooked hake from 2 and 3 lots. Almost no differences were apparent between the salted hake that received, respectively, 2 percent and 6 percent sodium bicarbonate; however; both of these lots had a more neutral flavour than hake from the control lot. A faintly foreign taste also was detected in bicarbonate-treated hake.

Each of the lots of hake had a similar salt content after cooking. The salt content, however, could be further reduced by soaking the hake for long periods in chilled water at 32° F. Hake that had been soaked for 8 hours in 4 to 5 times its weight of water and 16 hours in fresh ice-water slush before it was cooked for 15 minutes in five times its weight of water had a salt content of 1.1 to 1.9 percent in the thickest (3/4-inch) parts.

Reuse of salt for salting hake.—Fresh hake were filleted and salted below, between, and above the layers of fish at the rate of 1 pound of salt per pound of hake. After the hake had been in salt for 7 days. During which period the liquid was drained away from the hake continually, the hake were hung at room temperature until dry. Wet salt recovered from the first lot of salted hake was used to salt a second lot of hake; and, at the same time, a second similar lot of hake was salted with fresh salt from the original bag. Wet salt from these two lots was recovered, combined, and used to salt a third lot of hake. As before, a control lot was salted with fresh salt from the original bag. All of these lots of hake were held for 7 days in salt and then hung at room temperature.

Results.—Controls for each lot of hake and the hake salted had no off-odours or flavours either after salting or after drying. Hake salted with twice-used salt, however, were sour, had the typical cheesy odour of pinked fish, and showed heavy pinking after 7 days in the salt. Samples of all of the salts then were assayed by the drop plate method. Only one red colony developed in a 1 to 100 dilution of unused salt after 24 days of incubation. Once-used salts, however, produced abundant growth of red colonies at all dilutions with the first colony appearing after only 10 days of incubation. After 14 days the 1 to 100 dilution plates showed 76 and 69 colonies, whereas the 1 to 1,000 dilution plates showed 10 and 18 colonies, respectively.

With twice-used salt, red colonies first developed after 7 days, and at the end of 12 days they were innumerable in all dilutions. These results indicate a large and progressive multiplication of the bacteria present in the original salt with an accompanying marked decrease in the lag period. Rapid multiplication of halophiles can cause considerable loss from pinking if the salt is reused. In addition, wet salt was difficult to spread evenly. If the wet salt was dried, it caked badly and required milling before reuse.

MEETINGS AND CONFERENCES

World Scientific Meeting on the Biology of Sardines

The Fisheries Division of FAO and the Member Governments are organising a World Scientific Meeting on the Biology of Sardines to be held in Rome from 21–28 September 1958.

The world catch of sardine-like fishes in 1956 was about 7 million metric tons and of this quantity, it is estimated that the species of *Sardina*, *Sardinops* and *Sadinella* provided about a quarter.

Biologists have been studying the problems of the fluctuations in occurrence or availability of the sardines for many years and these fluctuations have from time to time disastrous economic consequences. Up-to-date there has been no opportunity for the workers in this field to meet and to discuss critically the problems and hypotheses based on existing knowledge nor to review techniques and research results.

The World Meeting will bring together participants form governments and private institutions and special attention will be given to this important problem of fluctuations in the catches and populations of the sardine. Almost all the fishing countries of the world are concerned with this problem and it is hoped that all will participate.

In addition to representatives of the various nations, organisations such as ICES, GFCM, NPFC, WMO, Unesco, ICSU and many others will be invited to send observers.

The Meeting will be conducted in English, French and Spanish and the official documentation for it will be issued in three different languages; if possible, Japanese and Russian interpretation will be provided.

The FAO will be responsible for financing the Meeting and will provide meeting and office space, secretariat personnel, duplication of documents and other required facilities while the participants themselves will be responsible for their travel and their lodging expenses.

The Meeting will provide, in relation to sardine research in general:

(i) a review of present knowledge of:

  (a) the development of the sardine fisheries and their current commercial exploitation;

  (b) the biology of the sardine species and stocks;

  (c) the environments of sardine populations;

  (d) fluctuations in the size of sardine populations and their catches;

(ii) discussion of specific problems and outlook for future international co-operation in studying and forecasting fluctuations;

(iii) discussion of the means whereby such International. Action could be made possible.

Copies of the Prospectus for the meeting may be obtained on request from the Fisheries Division, FAO, Rome.

GFCM 5th Meeting

The Fifth Meeting of the General Fisheries council for the Mediterranean will take place at the Rome headquarters of the Food and Agriculture Organization (FAO), 13 to 18 October 1958.

The Governments of Egypt, France, Greece, Israel, Italy, Monaco, Morocco, Spain, Tunisia, Turkey, the United Kingdom (Cyprus, Gibraltar and Malta) and Yugoslavia, have been invited to send delegations. The Governments of Bulgaria, Lebanon, Libya, Portugal, Rumania, Sudan, Syria, USA and USSR, and a number of international organizations have been invited to send observers.

"We shall have a good many interesting technical papers dealing with fishery problems of the Mediterranean," stated M.J. Girard, Secretary of the GFCM, speaking at FAO headquarters.

"These papers will cover, broadly speaking, such subjects as fisheries biology, production, ecnomics and statistics of the Mediterranean fisheries, the utilization of the catch, and problems concerned with the development of inland fisheries of the Mediterranean area.

"There is a steadily growing demand for the technical papers of the GFCM," Mr. Girard said. "These are published in the *Proceedings and Technical Papers of the GFCM.*"

Among the interesting subjects to be discussed at the forthcoming Meeting will be the study of the trawling grounds of the Mediterranean. It is hoped that eventually the GFCM will be able to publish the results of this study, detailing size and location of the trawling grounds, nature and extent of the catch, and other relevant data.

Organizations and persons interested in the Meeting and the activities of the Council should write to Mr. Gerard, Secretary, GFCM, c/o FAO, Viale delle Terme di Caracalla, Rome, Italy.

ICUN 6th General Assembly

The International Union for the Conservation of Nature and Natural Resources will hold its 6th General Assembly in Greece at Athens - Adelphi from 11–16 September 1958. Its 7th Technical Meeting will take place simultaneously and will consider two main themes:

Theme I–Soil and Water Conservation is expected to cover a number of subjects including the use of vegetation in erosion control, the effects of dams on habitat and landscape, the rates of run-off and evaporation, influence of soil and water conservation on natural aquatic resources and landscape management of an ecological basis.

Theme II–Education and Conservation will include a symposium on the rare animals and plants of the Mediterranean region.

The 7th Technical Meeting will open with an introduction in symposium on the history of erosion and its effect on the decline of farmers' civilisation.

Professor Umberto D'Ancona has accepted the post of Rapporteur-General for part of Theme I, regarding the influence of soil and water conservation on natural aquatic resources and has already received an interesting list of papers and contributions to be presented at the Symposium.

Mr. William A. Dill and Dr. G.L. Kesteven of FAO Fisheries Division, Rome, have contributed a paper "Methods of minimising the deleterious effects of water and land use practices on aquatic resources" which will be used as one of the 3 main background papers for the discussion on the above subject.

FORTHCOMING CONFERENCES, MEETINGS AND TRAINING CENTRES

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
		1958	
June			
3 - 11	Symposum on Quantitative Biology	The Biological Laboratory Cold Spring Habor, N. Y., USA	Cold Spring Harbor
4 - 7	ICNAF - Meeting of the Groups of dAvisers and Standing Committee on Research and Statistics	Executive Secretary International Commission for the Northwest Atlantic Fisheries Forrest Building Carleton Street Halifax, N.S., Canada	Halifax
9 - 14	ICNAF - Annual Meeting	- ditto -	Halifax
23	International Whaling Commission - 10th Meeting	Secretary International Whaling Commission c/o Fisheries Department Ministry of Agriculture, Fisheries and Food 3 Whitehall Place London, S. W. 1	The Hague
23 - 27	ECE Working Party on Standardization of Perishable Foodstuffs	Executive Secretary Economic Commission for Europe Palais des Nations Geneva	Brussels
30 - 4 July	Joint Meeting of the Asssociation Technique Maritime et Aeronautique & the Institute of Naval Architects, London	Institute of Naval Architects 10 Upper Belgrave Street London, S.W. 1	Paris
July			
7 - 15	Colloquium on Zoological Nomenclature - International Trust for Zoological Nomenclature	Mr. Francis Heming International Trust for Zoological Nomenclature 28 Park Village East Regents Park London, N.W. 1 or: Prof. H.R. Hever Imperial College of Science and Technology Prince Consort Road London, S. W. 7	London
12 - 27	Fiera di Ancona	Dott. Carlo Mattoli Segretario Generale Fiera Internazionale della Pesca Ancona, Italia	Ancona, Italy
16 - 23	15th International Congress of Zoology	Registrar 15th International Congress of Zoology c/o British Museum (Natural History) London, S.W. 7	London

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
July			
16 - 23	International Union of Biological Sciences - 13th General Assembly	Dr. J. Langjouw General Secretary IUBS 106 Lange Nieuwstraat Utrechts Netherlands or : Secretary IUBS c/o Istituto di Genetica Via Mezzacannone 8 Napoli, Italia	London
July - Aug.	Technical Meeting on Co-operatives	South Pacific Commission Post Box 9 Noumea, New Caledonia	Port Moresby, New Guinea
August			
4 - 9	7th International Congress of Micobiology	Prof. G. Penso International Association of Microbiologists c/c Istituto Superiore di Sanità Viale Regina Elena 299 Roma or : Dr. C. G. Hedén Secretary-General VII Congress of Microbiology Bakteriologiska Institutionen Karolinska Institutet Stockholm	Stockholm
10 - 16	International Congress of Radiation Biology	Mr. John S. Coleman Division of Physical Scienes National Academy of Scienees 2101 constitution Avenue Washington 25, D.C.	Burlington, Vermont, USA
11 - 14	6th Fisheries Conference of the North	Ministry of Fisheries Government of Denmark Copenhagen	Hindsgavl Slot, Denmark
13 - 19	3rd International Seaweed Symposium	Institute of Seaweed Research Inveresk, Midlothian Scotland or : Mr. M. de Valera Natural History Department University College Galway, Ireland	Galway, Ireland
20 - 27	Australian and New Zealand Association for the Advancement of Science - 33rd Congress	Dr. R. S. Burdon Department of Physics University of Adelaide Adelaide, South Australia	Adelaide

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
August			
20 - 27	10th International Congress of Genetics	Prof. J. W. Boyes General Secretary 10th International Congress of Genetics McGill University Montreal, P.Q. Canada	Montreal
28- 1 Sept.	4th International Biometric Conference	Secretary Biometric Society Rothamsted Experimental Station Harpenden, Herts. England	Ottawa
September			
1-13	2nd International Conference on the Peaceful Uses of Atomic Energy sponsored by UN	Secretary Executive Committee 1958 Geneva Conference Atomic Energy Research Establishment Harwell, Didcot, Berks. England	Geneva
3-6	International Institute of Refrigeration-Commission IV	Secretary International Institute of Refrigeration 177 Boulevard Malesherbes Paris 17e	Moscow
8-13	FAO Technical Meeting on Costs and Earnings of Fishing Enterprises	Mr. F.E. Popper Fisheries Division, FAO Rome	London
11-19	International Union for the Conservation of Nature and Natural Resources	Secretary-General IUCN 31 rue Vautier Brussels, Belgium	Athens
15-19	6th International Congress on Large Dams, International Commission on Large Dams of the World Power Conference	Secretary U.S. Committee on Large Dams 29 West 39th Street New York 18, N.Y.	New York
17-23	UNESCO – International Advisory Committee on Marine Sciences, 3rd session	Secretary International Advisory Committee on Marine Sciences UNESCO 19 Avenue Kleber Paris 16e	Paris
27 (2-1/2 weeks)	South Pacific Commission-18th session	South Pacific Commission Post Box 9 Noumea, New Caledonia	Noumea, New Caledonia

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
September			
29- 4 Oct.	International Council for the Exploration of the Sea	General Secretary ICES Charlottenlund Slot Charlottenlund, Denmark	Copenhagen
October			
1-4	UNESCO Planning for the Study of Peaceful Utilization of Atomic Energy	UNESCO 19 Avenue Kleber Paris 16e	Paris
4-8	International Congress of Hydro-Climatology	International Federation of Thermalism and Climatism International Society for Medical Hydrology Viale Castrense 9 Roma	Lacco Ameno, Ischia, Italy
5-9	Permanent International Committee on Canned Foods	Secrétaire Général Comité International Permanent de la Conserve 3 rue de Logelbach Paris 17e	Brussels
13-18	General Fisheries Council for the Mediterranean- 5th meeting	Secretary GFCM c/o Fisheries Division, FAO Rome	Rome
20- 28 Nov.	International Training Centre on the Methodology and Techniques of Research on Mackerel (Rastrelliger)	Director: Mr. Boon Indrambarya Director of Fisheries Bangkok Associate Director: Mr. S.J. Holt Chief, Research Programs Section Biology Branch Fisheries Division, FAO Rome	Bangkok
October			
4 days	UNESCO Symposium on Salinity Problems	UNESCO 19 Avenue Kleber Parris 16e	Teheran
November			
4	International North Pacific Fisheries Commission	Executive Director INPFC 209 Wesbrook Building University of British Columbia Vancouver 8, B.C., Canada	Tokyo

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
November			
16 - 21	International Conference on Scientific Information	U. S. National Research Council and U. S. National Academy of Science Executive Secretary ICSI National Academy of Sciences 2101 Constitution Avenue Washington 25, D. C.	Washington, D.C.
17 - 21	Gulf and Caribbean Fisheries Institute - 11th Annual Meeting	Executive Secretary Gulf and Caribbean Fisheries Institute Marine Laboratory University of Miami 439 Anastasia Avenue Coral Gables 34, Florida, U.S.A.	Miami Beach, U.S.A.
25	Permanent Commission of the International Fisheries Convention (1946)	Secretary Office of the Permanent Commission West Block, Whitehall Place London, S.W. 1	Dublin
–	Society of American Naval Architects and Marine Engineers	Society of American Naval Architects and Marine Engineers 29 West 39th Street New York 18, N.Y.	New York
December			
6 - 22	Indo - Pacific Fisheries Council - 8th session	Secretary IPFC c/o FAO Regional Office for Asia and the Far East Bangkok, Thailand	Colombo
Dec.	European Inland Fisheries Advisory Commission	Mr. W.A. Dill Chief, Inland Resources Section Biology Branch Fisheries Division, FAO Rome	Vienna ?
2nd half of year	Scientific Council for Africa South of the Sahara (CSA) - Symposium on Sea Fisheries on the West Coast of Africa	Scientific Secretary CSA BP 5175 Bukavu, Congo Belge	Cape Town

1959

April			
5 - 10	FAO 2nd World Fishing Boat Congress	Mr. J.O. Traung Secretary Fisheries Division, FAO Rome	Rome

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
April			
14 - 16	CIBA Foundation - 5th Colloquium on Ageing: The Life Span of Animals	Dr. H.N.H. Genese Deputy Director The CIBA Foundation 41 Portland Place London, W. 1	London
April - May	4th South Pacific Conference	South Pacific Commission Post Box 9 Noumea, New Caledonia	Malaguna, (Rabaul) Papua and New Guinea
May ?	FAO Technical Meeting on Fishery Co-operatives	Mr. F.E. Popper Fisheries Division, FAO Rome	Goteborg ?, Sweden
August			
19 - 26	International Institute of Refrigeration - 10th International Congress	Secretary International Institute of Refrigeration 177 Boulevard Malesherbes Paris 17e	Copenhagen
August			
20 - 8 Sept.	14th International Limnological Congress	Dr. T.T. Macan Generat Secretary & Treasurer International Association of Limnology c/o Freshwater Biological Assoication Ferry House Ambleside, Westmorland England	Vienna
30 - 12 Sept.	International Oceanographic Congress	American Association for the Advancement of Science in co-operation with UNESCO, the Special Committee on Oceanographic Research of ICSU, and FAO Dr. Mary Sears Chairman, Committee on Arrangements Woods Hole Oceanographic Institute Woods Hole, Mass., U.S.A.	New York
September			
21 - 28	FAO World Scientific Meeting on the Biology of Sardines	H. Rosa, Jr. Secretary World Scientific Meeting on the Biology of Sardines Fisheries Division, FAO Rome	Rome

OBITUARY

IPFC Current Affairs Bulletin records with deep regret the sudden death in an air accident in Mexico on 2 June 1958 of *Dr. Bell M. Shimada* and *Mr. Townsend Cromwell*, officers of the Inter-American Tropical Tuna Commission.

Dr. Shimada, formerly Senior Scientist of the Inter-American Tropic Tuna Commission and stationed at Honolulu, Hawaii, was recently appointed Head of a new unit and Chief Biologist in charge of the operations of the research vessel *Blair*.

Although he was not directly associated with the Council, Dr. Shimada's work on Pacific Tunas is well and widely known and he had many personal friends and correspondents on the coasts of the Pacific Ocean.

Mr. Cromwell formerly of the Scripps Institution of Oceanography, La Jolla, California, was recently appointed to take charge of the oceanographic studies to be conducted by the Research Vessel.

The *Bulletin* conveys its sincere sympathy and condolences to the families of these two prominent young scientists and also to their colleagues in the Commission.

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IMPORTANT IPFC PUBLICATIONS

PROCEEDINGS (Records of Council Sessions, normally held once every 18 months).

First Meeting, Singapore, 24 - 31 March 1949
- Section I: Report of Proceedings.
- Section II: Working Papers.
- Section III: Contributed Papers.
- Section IV: Symposium Papers.

Second Meeting, Cronulla, N.S.W. Australia, 17-28 April 1950.
- Section I: Report of Proceedings.
- Section II: Technical Papers.
- Section III: Symposium Papers.

Third Meeting, Madras, India, 1-16 February 1951.
- Section I: Report of Proceedings.
- Section II: Technical Papers.
- Section III: Symposium Papers,

Fourth Meeting, Quezon, Philippines, 23 October-7 November 1952.
- Section I: Report of Proceedings.
- Section II: Technical Papers and Symposium Papers.

Fifth Meeting, Bangkok, Thailand, 22 January-5 February 1954.
- Section I: Report of Proceedings.
- Section II: Technical Papers.
- Section III: Symposium Papers.

Sixth, Session, Tokyo, Japan, 30 September-14 October 1955.
- Section I: Report of Proceedings.
- Section II: Technical Papers.
- Section III: Symposium Papers.

CURRENT AFFAIRS BULLETIN (Quarterly).

No. 1-22, July 1951-July 1958.

SPECIAL PUBLICATIONS (Irregular).

No. 1: Schuster, W.H. (1952). Fish Culture in Brackish-water Ponds of Java. 1-143 pp.

No. 2: Anonymous, (1952). Fish Culture in Indonesia. 1-126 pp.

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